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COMPUTERWORLD

FORECAST 1995

Between the information superhighway, IS restructuring, client/server technology and the remote computing explosion, 1994 was a crazy year. But hang on to your seats. Our annual Forecast issue, beginning on page 15, looks at how far we've come in the past 12 months and spells out what IS can expect in the new year.

Big iron reawakens

By Craig Stedman

One of the dreams of the client/server revolution was that offloading application processing from host systems to PC networks would allow users to reduce their dependence on mainframes.

Well, dream on.

It turns out that client/server systems do little to rein in mainframe workloads. So say information systems executives at several companies that continue to store corporate data on IBM System/390 mainframes as they head down the off-loading path.

"People are worrying about having to buy a new mainframe just to handle batch processing. They don't know how to explain that to their management."
— Charlie Burns, Gartner Group

PC drain

Spreading powerful and user-friendly PCs around a company and letting them access mainframe databases can increase demands on big iron, the IS officials said. With PCs pulling down much greater amounts of data than terminals ever could, mainframes have more than enough work to keep them busy, even if their host processing role has been diminished, they explained.

"Dumb terminals can fit maybe 1,500 or 2,000 characters on a screen, but a [PC] can ask for half of a database, so the mainframe activity that it can generate is pretty significant," said Doug Underhill, a technical specialist in the IS unit at CSX Corp., a railroad company in Richmond, Va.

CSX has started implementing

Big iron, *page 7*

Merry Switchmas, users!

Internetworking rivals battle to win accounts

By Laura DiDio and Stephen P. Klett Jr.

Score one for internetworking users, who are finding lots of cheer this holiday season.

Companies in the midst of upgrading to next-generation hubs and routers are watching with glee as vendors fight for their business with promises of equipment buybacks, extended or free service and support, and deep discounts on capital equipment purchases.

"It's clear now that users are starting to react either positively or negatively to the merger," said Eric Hindin, an analyst at Strategic Network Consulting in Rockland, Mass. He was referring to the 5-month-old merger of SynOptics Communications, Inc. and Wellfleet Communications, Inc. that created Bay Networks, Inc.

Merry Switchmas, *page 10*

1993 combined hub/router market share

TOTAL MARKET: $4.1B

Bay Networks	21.5%
Cisco	20%
Cabletron	14.5%
3Com	7%
Digital	6%
Hewlett-Packard	6%
IBM	5%
Chipcom	4%
Other	16%

Source: The Yankee Group, Boston

Borland's Maib resigns

By William Brandel

CEO Philippe Kahn *(left)* and former COO Keith Maib

One week after emphatically denying he would even consider abandoning Borland International, Inc. in its darkest hour, Keith Maib, chief operating officer, quit. His resignation took effect Dec. 22.

Dismayed Wall Street analysts said Maib, who was brought in from Price Waterhouse eight months ago, was Borland's best and probably last hope to turn its operations around. Without Maib, there is little confidence in Borland's ability to rejuvenate its performance, they said.

Analysts speculated that Chief Executive Officer Philippe Kahn was back in charge after winning a struggle with Maib to control op-

Borland, *page 121*

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Pentium policy recalculated

Cyberspace wake-up call

By Ellis Booker

News, good and bad, travels fast in cyberspace.

Weeks before the daily papers or Wall Street got wind of the calculation error in Intel Corp.'s Pentium chip, the flap over it was gaining momentum in the on-line community. Particularly damning were the jokes, replicated across thousands of electronic-mail accounts, ridiculing the Pentium and its creators.

Marketing experts say Intel's painful experience at the fingertips of on-line critics should serve as a wake-up call to corporate America. Information and rumors flow with equal abundance and speed in cyberspace, and companies that fail to monitor and respond to such chatter do so at their peril.

Harley Hahn, author of the *Internet Yellow Pages* and the *Internet Complete Reference*,

Cyberspace, *page 121*

New chips — no questions

By Jaikumar Vijayan

Finally capitulating to extensive pressure, a chastised Intel Corp. used the waning weeks of December to announce a no-questions-asked chip replacement policy for its flawed Pentium processor. But don't expect a quick correction.

An almost palpable sigh of relief rippled across the Internet, where many users had savaged Intel's initial response to the chip flaw. However, analysts gave some credit for Intel's change of heart to PC suppliers, many of which had already instituted similar policies and thus pressured Intel to do the same.

Yet most customers can expect to wait several weeks or even months to get their replacements as vendors, service providers and Intel itself work out the logistics of a potentially mas-

New chips, *page 121*

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What's Inside

December 26, 1994/
January 2, 1995

NEWS

■ Companies **off-loading application processing** from host systems to PC networks are discovering that it is not doing much to reduce their dependence on mainframes, which are still facing increased workloads due to heavy requests for data from PC users. *Page 1*

■ **Internetworking users** are holding all the cards as the rivalry of Bay Networks, Cabletron and Cisco heats up. Users are now wielding their power to leverage better deals on service, support and pricing. Customers who are happy with their current vendors' equipment are standing firm and resisting pressure to switch. *Page 1*

■ Problems continue to plague the **LTE Elite** from Compaq, but most users consider them minor. *Page 4*

■ Users appear unconcerned with Microsoft's latest delay of **Windows 95**. *Page 4*

■ **Apple** stays in lockstep — and more — with Microsoft as it again delays its next-generation operating system in a move that could cost it corporate customers. *Page 6*

■ **Kioska**, which mostly failed in the '80s, are regaining popularity in government, retailers and banks. But companies implementing them should not expect quick profits. *Page 8*

■ **Distributed Technologies** is supporting the Open Database Connectivity standard in its Pathtracker asset management application. This gives users a standards-based way to bring information about client/server hardware and software assets into a broad variety of leading databases. *Page 10*

COMPUTER INDUSTRY

■ Computer resellers, distributors and retailers maintain that **Pentium sales** have remained largely unaffected by the recent controversy, although the level of concern seems to have escalated. *Page 12*

■ Siemens/Nixdorf Informationssysteme AG is trying to import its **European server business** into the U.S., but analysts say it will not be easy to find a spot in an already-crowded market. *Page 12*

DESKTOP COMPUTING

■ In recent months, vendors have been long on promises for **desktop applications** coming out in 1995. But a closer look reveals there will be more evolution — not revolution — in 1995 products. *Page 72*

■ Despite the delay in the **Windows 95** ship date, users say they are looking forward to implementing the new operating system in 1995. Meanwhile, IBM's OS/2 doesn't have much of a chance to win the popularity contest. *Pages 72 and 73*

WORKGROUP COMPUTING

■ The 1995 **network operating system market** will be the scene of a fierce battle between Novell's NetWare 4.1 and Microsoft's NT Server 3.5. Because both companies have already introduced their big guns, analysts predict they will add enhancements and put most of their muscle into out-marketing each other. *Page 77*

■ Integrated suites, workflow and perhaps some surprise punches are expected from **Computer Associates** in client/server applications next year. *Page 78*

■ Unix vendors are **building more connectivity** among their wares and machines running Microsoft operating environments. *Page 79*

ENTERPRISE NETWORKING

■ Threats to network and **computer security** will increase in 1995, but defenses are also improving. *Page 81*

■ Analysts expect 1995 to be a transition year in the **messaging market**, paving the way for big changes in 1996. *Page 81*

■ For vendors and users, 1994 was a turbulent year for **internetworking**. While next year should bring no new technology, keep those seat belts fastened because the bumpy ride will continue as the product plethora breeds confusion. *Page 82*

LARGE SYSTEMS

■ **IBM continues to work** on making its big iron and AS/400 systems more client/server-friendly. *Page 83*

APPLICATION DEVELOPMENT

■ The top goal of **database leaders** for the new year will be to provide good, graphical client/server development tools. *Page 89*

■ Users will not receive clear answers in the **client/server application** development market in 1995; more confusion is expected. *Page 89*

CAREERS

■ **Check that attitude!** In 1995, technical skills won't change much, but IS managers will look for staffers with business acumen and customer service mind-sets. *Page 92*

MARKETPLACE

■ **What's hot:** anything Internet-related. What's not: groupware, ATM. 1995's ins and outs according to Alan Radding. *Page 111*

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'Twas the night before crisis
and all through the house
Not a program was working,
not even a browse

The programmers were wrung out
too mindless to care
Knowing chances of cutover
hadn't a prayer

The users were nestled
all snug in their beds
While visions of inquiries
danced in their heads

When out in the lobby
there arose such a clatter
I sprang from my cubicle
to see what was the matter

When what to my wondering eyes
should appear
But a super programmer, oblivious
to fear
More rapid than eagles
the programs they came
And he whistled and shouted
and called them by name:

On Update! On Add! On Inquiry!
On Delete!
On Batch Jobs! On Query!
On Functions Complete!

His eyes were glazed over,
fingers nimble and lean
From weekends and nights
in front of the screen

A wink of his eye
and a twist of his head
Soon gave me to know
I had nothing to dread

He spoke not a word
but went straight to his work
Turning specs into code
then he turned with a jerk

And laying a finger on the
Enter key
The system came up and
worked perfectly

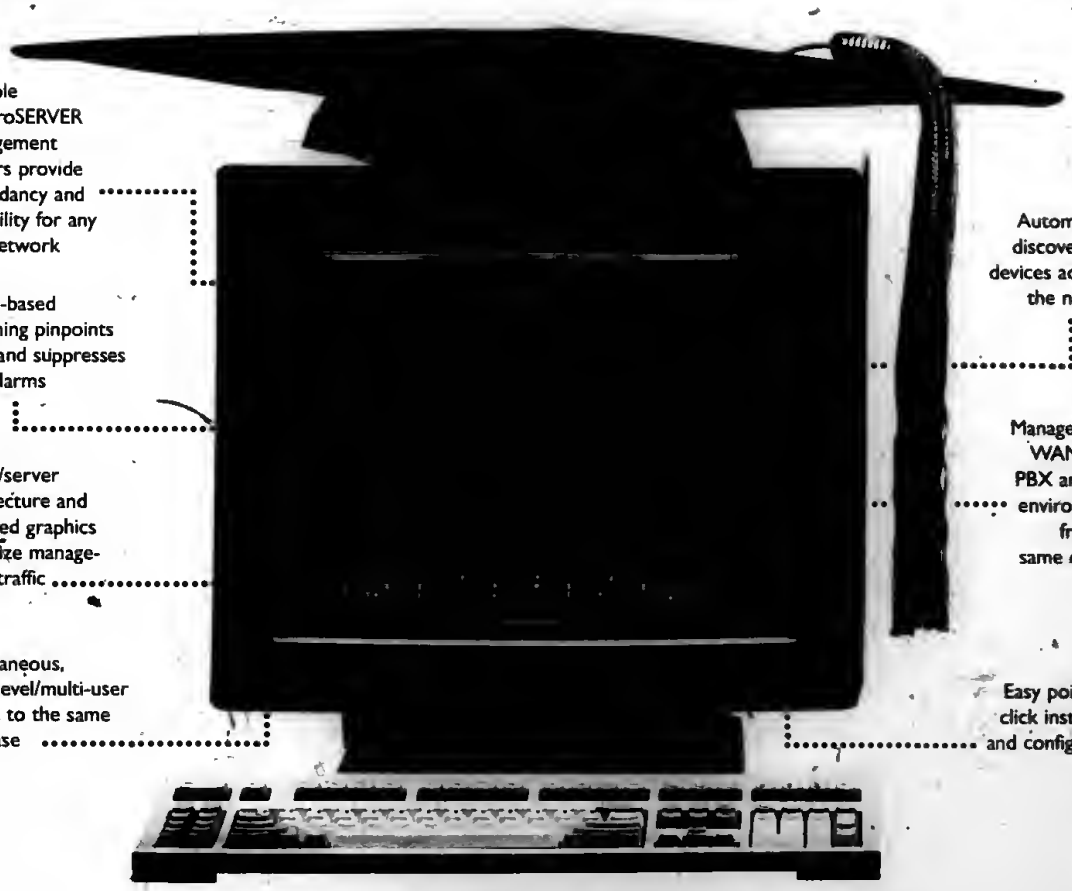
The updates updated; the deletes,
they deleted
The queries inquired; the closing
completed

The system was finished,
the tests were concluded
The users' last changes
were even included

But the user exclaimed
with a snarl and a taunt
"It's just what I asked for,
but not what I want!"

–ANONYMOUS INTERNET AUTHOR

LISA BLACKMAN



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Problems continue to bedevil Compaq's LTE Elite

By Jaikumar Vijayan

First it was a faulty read-only memory (ROM). Then it was a buggy PCMCIA controller. Now it is an errant built-in power supply.

Compaq Computer Corp.'s recent woes with its portable lines continue.

In a potentially embarrassing development, desktop leader Compaq acknowledged late last month that problems with a built-in 220V power supply had led to a product recall of its flagship LTE Elite notebooks from dealers in Europe. The problem does not affect U.S. users, but Compaq said it expects it will affect 10% of its users abroad.

"This is not good news for Compaq. It's another blow to their portable strategy," said Mike McGuire, an analyst at Dataquest, Inc. in San Jose, Calif. Even though the power supply problem may not be serious, the continuing series of minor but annoying flaws could undermine the Elite line, McGuire said.

According to Compaq, a problem with electric capacitors in the power supply could cause some Elites meant for the European markets to fail when plugged into certain European voltages. Only a "small number" of Elites have been shipped with the faulty power supply, a Compaq spokeswoman said.

> "Clearly this is something Compaq cannot afford with its portable products going forward"
>
> — Mike McGuire, analyst, Dataquest

However, Compaq said the power supply was not the primary reason for the recall. The reason, it appears, was an earlier problem with the machines.

"We are proactively replacing the power supplies. It is part of the ROM software upgrade we are currently carrying out in Europe as we did earlier in North America," a Compaq spokeswoman said.

She was referring to earlier problems with the Elites' system ROM, which prevented it from recognizing more than 16M bytes of RAM.

For units still with European dealers, the ROM upgrade and the power supply replacement will be done at Compaq's manufacturing facility in Erskine, Scotland. Technicians will be sent to user sites to replace the units in all other cases, Compaq said.

Inexpensive fix

"It doesn't appear to be a big deal," said Tim Bajarin, an analyst at Creative Strategies, Inc. in San Jose, Calif.

Fixing the problem is unlikely to cost Compaq much money, analysts said. The damage will be more in terms of customer perception of a product already known for problems — however minor, observers said.

"Clearly this is something Compaq cannot afford with its portable products going forward," McGuire said. Glitches such as these coupled with seriously delayed notebook product cycles may be hurting the company already. Recent figures from market researcher Dataquest show Compaq has slipped to a distant second place behind Toshiba America Information Systems, Inc., with which it was tied earlier.

Also, some said there may be more problems. For instance, one large Compaq customer in Miami, who is rolling out about 50 LTE Elites, said he received an advisory from Compaq alerting him to possible problems with network drivers on the SmartStation expansion unit in the LTE Elite. Others have complained of units that have shown up "dead on arrival" [CW, Oct. 17].

Discussion database market heats up for '95

By Suruchi Mohan

1995 will mark the emergence of discussion databases as part of the standard bag of messaging offerings from key vendors.

Analysts say the convergence of electronic mail, Internet activity and workgroup computing will drive this trend, which users view as a necessity.

Bulletin boards, often used synonymously with discussion databases, allow the posting of messages without crowding individual mailboxes.

"We sent out E-mail asking if people wanted [bulletin-board-type services], and the response was overwhelming," said Lisa Wilson, a computer analyst at Washington state's Department of Ecology in Olympia. "It will be as popular as E-mail," she noted.

Analysts said a large percentage of users already employ Notes for discussion purposes. "Notes can do bulletin-board features," said Tim Sloane, an analyst at Aberdeen Group in Boston. He said while such usage does not fully exploit Notes' capabilities, it often depends on how the product is initially used.

That is what Microsoft Corp. and Novell, Inc. had in mind when they entered partnerships with The Mesa Group and Collabra Software, Inc., respectively, to round out their product offerings and compete more aggressively with Notes.

Although every workgroup computing product is subjected to the Notes test, Michael Bragen, principal at Business Management Consulting in Lexington, Mass., said the Microsoft and Novell offerings address the low-end segment of the market that Notes has avoided.

This is the "first time developers of those products have said they will build their products on top of the messaging infrastructure," said Eric Arnum, editor of "Electronic Mail and Micro Systems."

True enough, agreed Patrick Whyte, manager of systems support at EG&G Energy Measurements, an engineering firm and large Novell GroupWise 4.1 site in Las Vegas. Whyte's firm had been using a DOS-based bulletin board that could not handle all the messages his users wanted to post. He bought Collabra Share in September and was happy when he heard about its alliance with Novell. Better integration between the two products would make life simpler, he said.

An important component of this trend is the Internet, which is rapidly gaining a stronger foothold in the user psyche. Sloane said the Internet is the wild card in the Lotus, Microsoft, Novell competition for an ever-larger share of the market. Internet providers, regional-access firms and content providers will bring new dimensions to the market, he said.

Netscape Communications Corp. is one such firm. It recently announced the Netscape Communications Server and Netscape Commerce Server, which let users exchange information and conduct commerce over the Internet using standards such as HyperText Markup Language and World-Wide Web protocols.

Netscape, however, is taking great pains to position itself only as an access point for the Internet. What differentiates it from discussion databases is that it is good for one-to-many communications but not for many-to-many, said Jeff Treuhaft, server product marketing manager at Netscape in Mountain View, Calif. The communication will become two-way by the end of 1995, but the Netscape line is not intended to compete with discussion databases, he said.

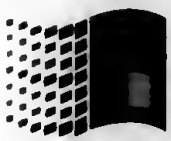
Users appear unconcerned with latest Windows 95 delay

By Stuart J. Johnston and Ed Scannell

Call it Windows 95 and three quarters — and if Microsoft Corp. has to move the release date of the next major upgrade of Windows again, they may have to rename it Windows 96, some users joked.

Although some users appeared a little impatient that Windows 95 will be delayed until August, most echoed the sentiments of John Berting, manager of software engineering at Rheometric Scientific, Inc. in Piscataway, N.J. Berting said he would rather see Microsoft get it right than on time.

He added that if Windows 95 elicits the level of demand that Microsoft has predicted — 30 million units in the first 12 months — "and if there's any kind of installation problem, it's going to blow up in their faces."



No hurry

Several users said their companies have no plans to upgrade immediately to the new system anyway. Instead, they will wait at least six months after delivery to make sure any final bugs are fixed. *Computerworld* reported in November that most corporate users plan to hold off initially, but many intend to upgrade at least half of their users by the end of the first year.

Brad Silverberg, senior vice president of Microsoft's Personal Operating Systems division, said on Dec. 20 that the company decided to add two months to the schedule because of feedback from the 48,000 users who have been beta-testing Windows 95 since early November. He said some installation problems and some hardware and software compatibility issues are the major holdup. "The job of installing smoothly on 60 million machines is a tough one," said Rogers Weed, Windows 95 group manager.

Microsoft said the two-month delay will be enough to fix existing problems and that no features would be added in the interim.

However, not everyone believes Microsoft's explanation about the delay.

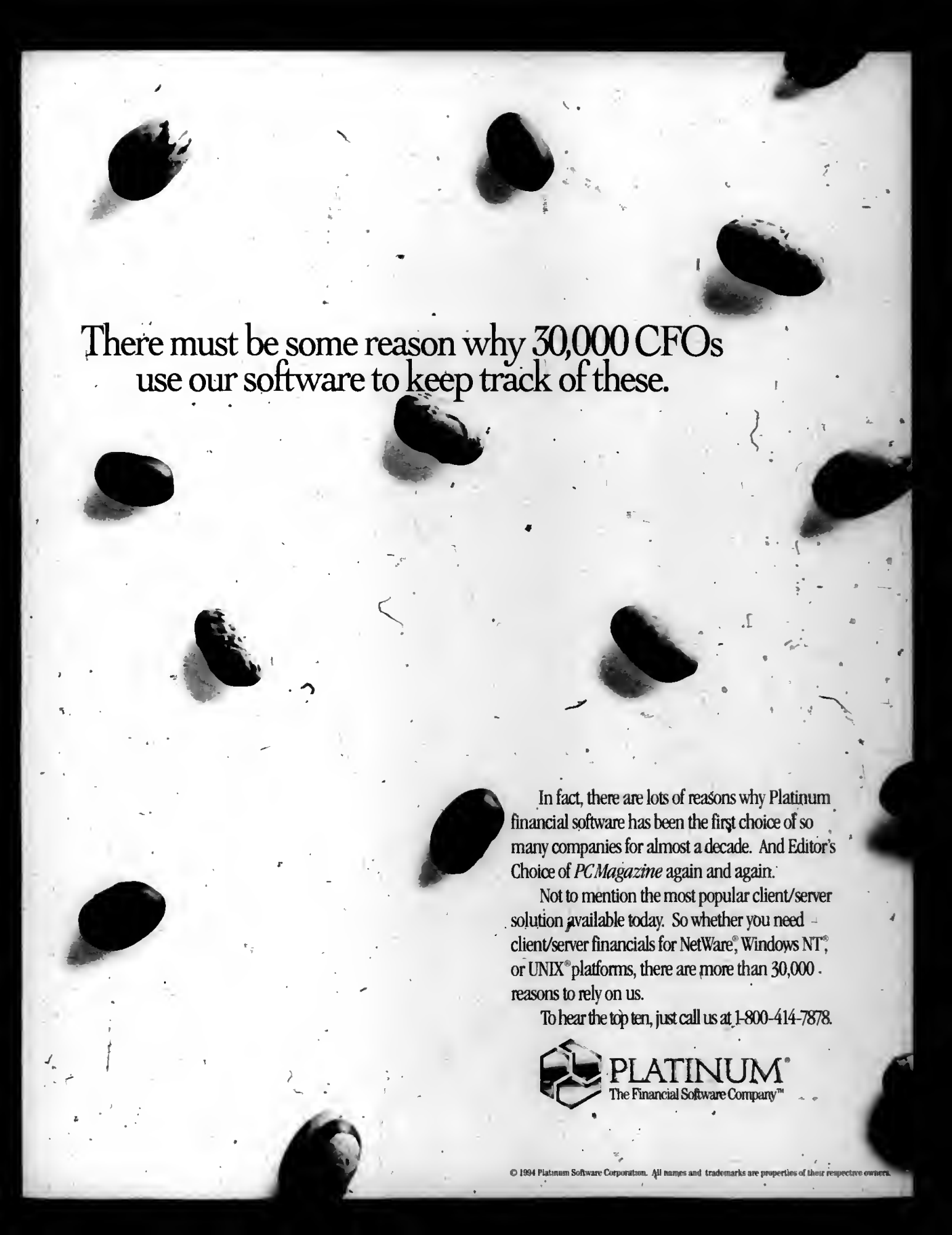
"I think if they have any problem with the product at all it is with Exchange [the universal E-mail client] and [is] Microsoft Network-related," said Bill Mattox, a systems consultant at an international financial services corporation on the West Coast. The mail client "is a little slow, [and it] is not being done by the Windows 95 group [but rather] by the MS Mail group, and so it is really like trying to integrate some other vendor's product" into the operating system, he said.

Microsoft officials, however, flatly denied the delay has anything to do with either the Exchange client or the Microsoft Network, which is currently in beta testing. Support for the Microsoft Network is slated for Windows 95.

Similarly, independent software vendors said the delay will cause a slight headache but extends the market for their existing products.

"We expected that there would be a healthy 16-bit Windows market through 1995," said a spokesman from Lotus Development Corp. "This news reaffirms it; it doesn't negate that position."

Senior editor William Brandel contributed to this story.



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Desktop systems

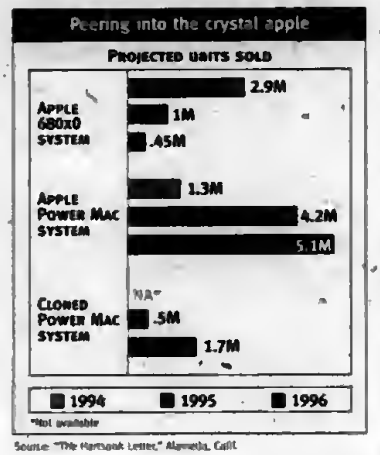
Apple strives to keep, gain users

By Mark Halper

For Apple Computer, Inc., 1995 poses the question of whether the company can maintain the momentum of its 10-month-old platform of the future: the Power Macintosh.

Many users and analysts say the answer lies partly in whether Apple will be able to woo desktop users from "WinTel" x86/Microsoft Corp. environments and partly in Apple's ability to find new customers.

Apple's ability to license its Mac OS operating system and engender a Power Macintosh clone market will also be instrumental, as a clone market should spur software development that users said would also drive hardware sales.



Source: "The Network Letter," Alameda, Calif.

Loyal users

Apple got off to a roaring start with its PowerPC-based systems in 1994. A spokesman said Apple sold more than 600,000 Power Macintoshes through September. The company said it expects to meet its long-stated goal of selling 1 million Power Macintoshes in its first 12 months. Some analysts said Apple has already hit that mark.

But virtually all of those sales have been to Apple's installed base of 680x0-based Macintosh users.

"Our research has shown that Apple customers have been very loyal in buying from Apple, but Apple has not been too successful in converting users over from WinTel," said Dan Neis, director of microsystems research at Computer Intelligence InfoCorp in La Jolla, Calif.

That is not to say Apple will soon run out of sales potential among its installed base. After all, San Jose, Calif.-based research firm Dataquest, Inc. noted that Apple sold 12.2 million 680x0-based Macintoshes between 1989 and 1993 — and many of those are still in circulation.

Causing a stir

But a wave of "WinTel" curiosity is running through that installed base as Apple users catch beta glimpses of Microsoft's forthcoming Windows 95 operating system. Delays in Apple's Mac OS are fueling that curiosity (see story above right). For one reason, Windows 95 is expected to include many of the friendly user interface features that have long distinguished Apple's system.

"There is a lot of pressure on IS departments to get Windows client/server tools," said Brian Comnes, an information center manager in the Apple shop at DHL Airways, Inc. in Redwood City, Calif. "If you look at the market, Windows has more client/server development tools than Macintosh."

Some Apple devotees are keeping the faith, however. Matt Ghourdjian, national director of technology at Los Angeles-based law firm Howrey & Simon, said he believes Apple's hardware introduction plans this year will lure users from the x86 architecture.

Apple is expected to provide substantial performance improvements in the Power Macintosh when it introduces desktop systems built on the next-generation PowerPC 604 chip. It is also incorporating the speedy Peripheral Component Interconnect bus as a replacement for Apple's NuBus.

Those machines, as well as PowerPC-based laptops, are expected to be introduced by midyear, but the 604 desktop systems may not be available until late 1995.

"The whole design [of the 604 systems] is industrial-strength," Ghourdjian noted. "I think this is where you'll see the gap widen between the PC world and the Mac."

Apple pushes Copland to '96

By Mark Halper

■ Microsoft Corp. is not alone in owning up to the latest in a series of next-generation operating system delays. Apple Computer, Inc. has quietly followed suit — a move that could cost it some corporate customers.

As users were preparing for holiday breaks, Apple confirmed "for anyone who asked" that it has pushed its target date for shipping its Copland operating system, also known as System 8, to mid-1996. A few weeks ago, Apple offered up a delivery date of the end of 1995 [CW, Dec 5]. Copland was originally slated for a midyear 1995 arrival.

Apple is not knocking itself out to announce this latest delay. It does not plan to generally notify users, according to Copland product manager Vito Salvaggio, who said many users will learn about the new schedule from the media. Apple's sales subsidiaries will notify customers "as they see appropriate," he added.

Salvaggio attributed the delay to "the general complexity of the operating system." Integrating many features, such as Apple's Open Document document management system and Open Transport cross-environment data support, has been challenging, he said.

If Microsoft sticks to its own recently revised shipping schedule for Windows 95, the next version of Windows (see story page 4), it will have almost a year's head start in sales. Apple users are gaining interest in Windows 95 because it incorporates many of the user-friendly interface features that have long distinguished the Macintosh operating system.

"If Win95 does get released and Apple has nothing to show, it's going to be tough to come up with the business decision that Macintosh is the way to go," said Brandon Shults, director of store information systems at Trader Joe's Co. in South Pasadena, Calif. Almost all of Trader Joe's 130 or so desktops are aging 680x0-based Macintoshes, which the company will eventually replace with Power Macintoshes or Windows machines, he said.

Senior editor Kim Nash contributed to this story.

Chain reaction

The Copland delay has pushed back Apple's plans to ship Gershwin, the operating system that will follow Copland and provide full pre-emptive multitasking and an overhaul of the user interface. Vito Salvaggio, Copland product manager, said Gershwin will not be ready until at least 1997.

Power Macs to star at exposition

By Mark Halper
SAN FRANCISCO

Apple Computer, Inc. will take the product limelight at this week's Macworld show with the introduction of three Power Macintosh models that offer improved price/performance over existing models.

Apple will also introduce a $549 wireless device called Apple Mobile Message System. It enhances communications for Apple's PowerBook laptop computers, the Newton MessagePad personal digital assistant and Windows-based laptops.

MACWORLD EXPOSITION

Next apples on the tree

Model	6100/66	7100/80	8100/100
Speed	66 MHz	80 MHz	100 MHz
Cache	256K bytes	256K bytes	256K bytes
Storage	350M bytes	500M bytes	700M bytes
Price	$1,819	$2,899	$3,699

The three new Power Macintoshes (see chart) represent speed boosts and performance improvements of 20% to 40% over existing models. Apple is bumping its 60-MHz model 6100 to 66 MHz, the 66-MHz 7100 to 80 MHz and the 80-MHz 8100 to 100 MHz [CW, Nov. 7, 1994]. The company began ratcheting up Power Macintosh speeds in November when it added a 110-MHz model to the 8100 line.

Users said they were eager to put the new machines through their paces to discern actual performance improvements. Brandon Shults, director of store information systems at Trader Joe's Co. in South Pasadena, Calif., said he would be interested in benchmark results comparing the new Apple computers with PCs based on Intel Corp.'s Pentium chip.

Trader Joe's is predominantly an Apple shop but has yet to convert any of its 130 Macintoshes to Power Macintoshes, Shults cited a recent benchmark study published by *MacWorld* magazine that compared Apple's 110-MHz 8100 to a 90-MHz Pentium-based system; each platform won seven of the 14 categories. Shults said that result does little to convince him that the PowerPC-based Power Macintosh provides hands-down performance leadership.

Message away

Meanwhile, Apple said its new Mobile Message System will enable Apple users to receive and display long text messages. The PCMCIA-based device can also be programmed to automatically receive information updates for spreadsheets, calendars and other applications. But because it requires the MacOS operating system for many of its features, it will have limited capability on Windows laptops, an Apple spokeswoman said.

Mobile Message System attaches to a laptop or Newton through a PCMCIA slot and routes messages to MacOS's PowerTalk "universal mailbox." It includes a small LCD display for viewing short messages; longer messages are displayed on the Newton's or laptop's screen.

The device will require 8M bytes of RAM on an Apple laptop and 4M bytes on an x86-based laptop, Apple said.

Big iron

CONTINUED FROM PAGE 1

an OS/2-based geographic information system that tracks the status of freight trains as they travel on the railroad. It plans to move more tasks to PCs in the next 12 to 18 months, Underhill said. However, data will still be stored centrally, and early indications are that the consumption of mainframe processing cycles will continue to increase.

Reducing mainframe usage through off-loading "is probably only true if you don't ever expect [PCs] to come back and speak to it again," Underhill noted.

Above zero

The county of Santa Cruz in California has reduced its annual mainframe MIPS growth from more than 20% to about 15%, "but it doesn't look like it's going to go down to zero," said Luther Perry, information services director for the county. Usage of mainframe applications is still increasing, but the rigors of moving data between the mainframe and several new LAN-based applications is contributing to the workload increase, he added.

Even distributing data to smaller servers may not stem mainframe growth if batch processing is still done on a System/390. Charlie Burns, an analyst at Gartner Group, Inc. in Stamford, Conn., said he has seen cases where nightly batch workloads have shot up as much as 50% due to the strain put on the mainframe as it pulls the required data out of client/server systems.

"People are worrying about having to buy a new mainframe just to handle their batch processing," Burns said. "They don't know how to go and explain that to their management."

On average, large system shops plan to off-load about 10% of their processing from mainframes during 1995, according to a recent survey of 450 Gartner Group clients. During the same period, however, those companies expect to increase their mainframe capacity by 15%, said Mark Hess, another Gartner analyst.

In fact, the continuing need for more and more capacity is helping to fuel the overall mainframe resurgence that started in early 1994. After dropping in both 1992 and 1993, IBM's mainframe shipments were expected to shoot up 39% in 1994 to a record 160,000 MIPS, according to Annex Research in Phoenix. Annex forecast another 13% increase during 1995, to 180,000 MIPS.

The increased user productivity made possible by PCs "doesn't come for free," Burns said. "Most customers are looking at an increased [mainframe] workload no matter what they do."

"I haven't found that you off-load a whole lot," agreed Bill Neuser, director of capacity planning and support at Great Western Bank in Northbridge, Calif. "The mainframe doesn't do it all now, but it still does more work."

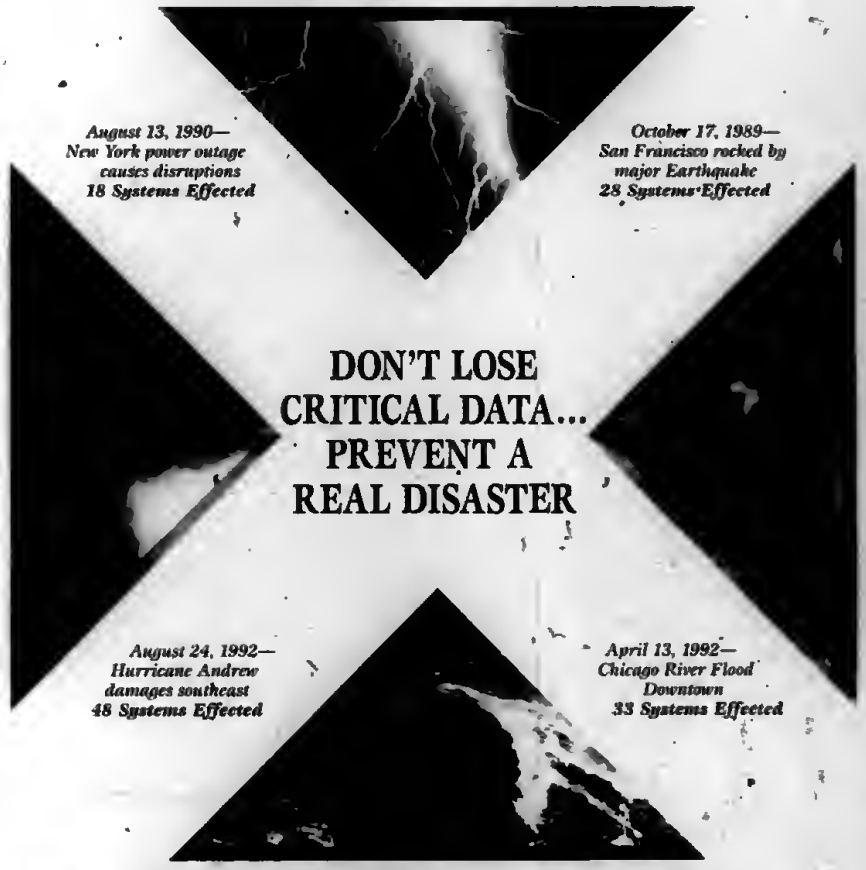
Great Western installed LANs in its branch offices to process retail transactions locally, but all data is still uploaded to the mainframe and then made available for downloading on a companywide basis. "All we see is our back-office processors running a lot hotter than they used to," Neuser said. The bank plans to upgrade its System/390 in 1995.

An IS executive at a large Midwestern insurance company said his firm plans to start off-loading its electronic-mail and spreadsheet applications to LAN-based products in January. Mainframe usage may flatten out temporarily, but that is not expected to last, added the executive, who asked not to be identified.

"It's reasonable to assume that as users get comfortable with [PCs], they'll drive the mainframe harder and harder," he said. "We're not going to hold the line on mainframe growth. We'll just push it a few months down the road, when [upgrade] prices should be cheaper."

That may be the best customers can hope for. This is because some users and analysts project that the savings gleaned from deferring a mainframe upgrade may well be eclipsed by the cost of purchasing, implementing and running PC networks. "Client/server ain't saving anybody anything," Neuser said grimly.

Mainframes continue to experience renewed growth. See page 83.



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Multimedia

Kiosks head for fast track but profits slow

By Mary Brandel

You fly into an unfamiliar city. Before leaving the airport, you preview area restaurants, make reservations and print out a map with directions.

At a crowded bank, you bypass the line and use a touch screen and video link to speak with a teller.

If multimedia self-service kiosks succeed this time around, these types of capabilities will abound. In 1994, the number of kiosks in the U.S. totaled 70,000, according to Inteco Corp., a research firm in Norwalk, Conn. By 1997, they will increase to 359,000, said Tom Leonard, an analyst at Inteco.

USAir Group, Inc., JC Penney Co., Best-Buy Co., Ford Motor Co. and KeyCorp are just a few of the retail, public sector and financial institutions piloting or implementing kiosks.

The SoftAd Group *built a kiosk for General Electric Capital Co. as part of GE's program for house purchasers. The kiosk guides users through a primer on buying a house.*

But there has been plenty of kiosk roadkill between the late 1980s (when they were first tried and failed) and today. "The goals were wrong and reliability was poor, so most projects just ended," Leonard said.

Winning ways

While their customized nature will likely limit kiosks to niche markets, observers said they see many reasons for success today. These include lower prices, particularly through the use of CD-ROMs and off-the-shelf technology; better hardware reliability; easier authoring tools; interactive capabilities via multimedia; and the ability to analyze captured data.

Many firms choose systems integrators for implementation, but "there's no question that [kiosks pose] an opportunity for IS people who are willing to walk the marketing walk," said Alan Brody, president of Createch in Scarsdale, N.Y.

But before you get kiosk-happy, be warned that not all of them are profitable. "Kiosks that try to sell products and services will never make money," Leonard said.

At Best-Buy, for example, "we're not providing information so we can sell you something," said Clark Becker, director of distributed processing at the discount consumer electronics retailer. The company recently implemented hundreds of kiosks in 21 stores. "It's a tool to figure out if what's on the shelf is what you need," he said.

For instance, a customer can see via full-motion video clips how much resolution they need on a new TV or if they need motion control on their camcorder.

Overnight data delivery

The ability to update data such as prices is something many older kiosks could not do. At Best-Buy, the corporate mainframe downloads new data each night to local Digital Equipment Corp. AlphaServer 2100s running Microsoft Corp. Windows NT in the stores.

A mistake many retailers make is letting programmers design the interface, Becker said. "They just walk you down a programmer's decision tree [and end with a question such as], 'Do you want an avocado or white refrigerator?'" he said.

Another mistake in older kiosks is that they tried to automate too much, said Michael Treacy, president of Treacy & Co. in Cambridge, Mass. "The most powerful part of multimedia in kiosks is that you can still interact with the person who's helping you," he said.

That is the approach at KeyCorp, a bank that is piloting kiosks at a number of branches. If users want to open an account or order checks, they press a button on the touch screen for a video connection to a teller.

Unlike Best-Buy, KeyCorp's bottom-line goal is to sell more products, with payback expected in three years. Banks are not building kiosks as quickly as the public or retail sectors, but the technology does make sense, Leonard said. Whereas a kiosk might cost $25,000 to build, a branch can cost $150,000 per year, Treacy estimated.

Another advantage of today's kiosks is the ability to collect consumer data. Ford Motor Co., for instance, may add a demographic survey to its kiosk to assist with target marketing, said Andre Holper, operations director at The SoftAd Group, a kiosk builder in Mill Valley, Calif.

News Shorts

First Mac clone is a done deal

After years of market anticipation, Apple Computer, Inc. has finally licensed its Macintosh operating system — to **Power Computing Corp.**, a small PC clone maker in Milpitas, Calif. Under the terms of the deal, Power Computing will serve as an OEM of logic boards and complete systems but will continue to market its own brand of computers. Company officials said they intend to market the MacOS-compatible systems at "very aggressive entry-level" prices through a variety of innovative design, manufacturing and distribution strategies. Company officials were not available at press time to comment on the details of those strategies. For years many industry observers have encouraged Apple to license its proprietary operating system in an attempt to gain market share among corporate accounts through price competition. The largest shareholder in Power Computing is Ing C. Olivetti & Co. No company officials could be reached last week to discuss Olivetti's plans for licensing the operating system. The company did say it plans to ship the Power PC-based systems running the Macintosh operating system in the spring.

Navigation Server ships

Sybase, Inc. released Navigation Server in late December, squeaking in under an end-of-1994 deadline for general shipment of the parallel processing database add-on product. Navigation Server had been delayed at least twice since it was announced in November 1992 while engineers at Sybase and development partner **AT&T Corp.** worked to improve speed and performance. The task for Sybase is to get Navigation Server working with the latest edition of its database, System 10. Now, it works only with the previous version, SQL Server 4.92.

Microsoft files copyright suit

Microsoft Corp. late last month filed a copyright infringement lawsuit against two resellers, **Evertek Computers** and **Kou-Tsui Ma**, claiming the companies illegally distributed Microsoft software at a trade show. The suit, filed in U.S. District Court for the Central District of California, represents Microsoft's ongoing efforts to "clean computer trade shows and swap-meets of illegal hard disk loading and counterfeiting [of] Microsoft's products," a company spokesman said.

Client/server spending up

Client/server spending shot up 75% in 1994 from 1993, according to a recent survey from Dataquest, Inc. and Sentry Market Research. The survey, which included responses from 575 companies, found the average company dished out $12.3 million on client/server technology last year. Typically, a company spent 40% on hardware; the remaining 60% was split between software and services.

IBM Ramac arrays shipping

IBM said it is now shipping more than 200 of its Ramac mainframe disk arrays per week. Ramac production had been constrained because of a short supply of some parts used in the arrays, forcing IBM to schedule some deliveries later than customers had originally expected. While shipments are ramping up, the company said it will still take into the first quarter of 1995 to get completely up to date on orders. All told, IBM has shipped 1,000 Ramac subsystems, which support redundant arrays of inexpensive disks Level 5 technology.

Sabre president moves on

Sabre Decision Technologies President Thomas M. Cook is leaving his post to become a special decision-support systems consultant to **AMR Corp.** Chairman Robert Randall. Terrell B. Jones, currently president of Sabre Computer Services, has been named to fill Cook's post.

IBM claims Warp is hot

IBM on Dec. 21 announced it has sold more than 800,000 copies of OS/2 Warp worldwide. According to company officials, that figure does not include sales to the Japanese and Chinese markets, where OS/2 2.x has previously sold well. The company is expected to release the Full Pack version of OS/2 by the end of January.

Microsoft tries broadband

Although it will not have a single subscriber before. Windows 95 ships, **Microsoft's** on-line information network is already positioning for its next phase: broadband access. On Dec. 21, cable giant **Tele-Communications, Inc.** in Englewood, Colo., took a 20% stake in The Microsoft Network for $125 million in stock. TCI officials described the company's role as that of an investor in Microsoft's on-line venture rather than that of a development partner.

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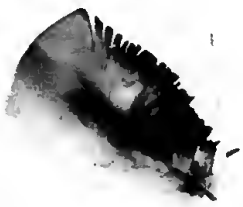

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Added support for Pathtracker enhances ODBC

By Steve Moore

With Distributed Technologies Corp.'s recent announcement of Open Database Connectivity (ODBC) support for its Pathtracker asset discovery and management application, users now have a standards-based way to bring information about client/server hardware and software into a variety of leading databases.

An ODBC-compliant systems management application such as Pathtracker can be used to select any ODBC-compliant database as a repository for systems data.

"We were looking for something ODBC-compliant because we've been burned before on products that use their own proprietary databases," said Gary Wallace, MIS manager at Chevron Corp. in Port Arthur, Texas, and a Pathtracker user. Chevron uses the product's autodiscovery capabilities to collect systems information remotely without sending a technician to manually inventory each machine, he said.

"Distributed Technologies is very early on support for the most popular de facto standard that allows asset-tracking middleware to act as a translator between any particular desktop client and lots of different databases," said Brad Day, director of client/server computing research at Dataquest, Inc. in Framingham, Mass. He noted that leading database providers, including Oracle Corp. and Sybase, Inc., support ODBC.

"This lets the user have some comfort that ODBC really is the standard that people are going to start gravitating to," said Cheryl Currid, president of Currid & Co., a Houston consultancy. "ODBC has the potential to be the next SQL — the one that people standardize on."

Across the universe

ODBC support makes it easier for companies to move applications from PC-oriented databases to larger Unix-based databases as their end-user populations grow, said Rick Houpt, marketing director at Distributed Technologies in Waltham, Mass. Another advantage of ODBC is that a user switching from one database to another does not need new binaries or driver software, he added.

"One vulnerability of the ODBC standard is that its architecture is controlled by Microsoft," Day noted. Independent software vendors "that design to it are possibly given less of a vote in terms of how the specification is revised or changed."

Another issue is one of openness vs. performance, cautioned Bill Larson, president of McAfee Associates, Inc., whose LANInventory product competes with Pathtracker. "Users want the benefits of openness, but will they take those benefits at the cost of a performance hit?" he asked.

ODBC-compliant products do not perform as well as proprietary products that are optimized for use with a particular database, Larson said. But for users who are interested, McAfee's LANInventory will be available with ODBC support in early 1995, he said.

Merry Switchmas

CONTINUED FROM PAGE 1

With the stakes so high, there is almost nothing Bay Networks, Cabletron Systems, Inc. and Cisco Systems, Inc. will not do — including jumping out of planes (see story below) — to keep or win users.

"Cabletron replaced $250,000 worth of SynOptics equipment for next to nothing to win my business," said Rick Graham, director of systems integration and planning at Lahey Clinic in Burlington, Mass. The clinic also negotiated training for support personnel at "reduced or at no extra cost," Graham said.

> "Cabletron is more aggressive. . . . They're the Energizer Bunnies of the internetworking industry"
> — John McVicar, Network analyst

"Cabletron is more aggressive and opportunistic than its rivals," said John McVicar, a network specialist at a leading Boston medical center. "They're the Energizer Bunnies of the internetworking industry."

Can't win 'em all

Still, Tullet & Tokyo, Forex, Inc. switched from Cabletron to SynOptics this summer because it felt it was not getting enough service and support, said Len Monteleone, a vice president at the New York firm. "Once [Cabletron] got us, they became very complacent," Monteleone said.

Barbara Maaskant, director of information services at Emory School of Public Health in Atlanta, opted for a combined Cabletron/Cisco offering because of superior service and support.

"I've never had such conscientious attention from vendors," she said. "Cabletron called me every day and attended to every possible detail."

Mark Shahan, LAN administrator at the state of California's Department of Toxic Substances Control in Sacramento, said he was bound to go with the lowest priced equipment in the state-run store. In this case, it was Bay Networks' bid.

"I got a kick out of the way they were all fighting over me," Shahan said. "Cabletron was much more aggressive, and we would have gone with them were it not for price."

Yet some satisfied customers refused to be swayed, merger or no merger.

One such customer was Household International in Northbrook, Ill., which switched from Cabletron hubs to SynOptics. "We felt SynOptics could handle everything better," said Timothy Portokalis, manager of business systems.

Cabletron offered sister company Household Credit Services 65% on equipment buybacks to switch vendors, but the company declined.

As a longtime Wellfleet shop, Household International would like to see some improvements, however. "Support from Wellfleet has been inversely proportional to their volume of sales. They are experiencing some growing pains. They've been jerking us around with ship dates," Portokalis said.

Conversely, Jeff Jeffers, director of network services at Boston College in Newton, Mass., said the university, a SynOptics shop, is switching to Cabletron because of 20% cheaper hub prices and some support issues. In addition, the service and support costs are about half what Bay Networks offered. He said he is also leery of Bay Networks because of the merger.

New Year's dissolution

Bay Networks and Cabletron Systems will ring in the New Year in the midst of a contract squabble concerning Cabletron's right to sell and support routers from Wellfleet Communications.

Bay Networks told *Computerworld* it will not renew its three-year reseller contract with Cabletron, which ends Feb. 1, because it "was not making any effort to sell Wellfleet routers."

Cabletron confirmed that the contract would not be renewed.

"It was totally Wellfleet's decision. We would have been open to the idea of continuing to resell their equipment since we do have joint accounts," said Craig Benson, chairman of Cabletron. "The only one who gets hurt by this is the customer."

Bay Networks downplayed the effect of the contract lapse, however.

"Even resellers whose contracts are terminated can still have support contracts for their installed base, and we may do that for Cabletron," said Gary Bowen, vice president of marketing and field operations at Bay Networks. "Most large customers are already dealing directly with Wellfleet for support, though."

— Stephen P. Klett Jr. and Laura DiDio

Falling down on the job

The old adage, "You say jump, and I'll ask how high," came true — literally — for one Cabletron sales manager who leaped from a plane at an altitude of 9,000 feet to oust rival Bay Networks from a user account.

The prize for the successful skydive was a hefty one: Greg Mayhew, Cabletron's regional sales manager for the Silicon Valley region, won a $250,000 contract from Strategic Mapping, Inc. in Santa Clara, Calif.

Cabletron's Greg Mayhew (bottom), pictured with his jump instructor, went to new heights to land a deal with Strategic Mapping

The idea for the stunt began during a casual lunch between Mayhew and Alan Saylor, a former senior network systems administrator at Strategic Mapping.

For months, Mayhew religiously repeated Cabletron's credo of "doing whatever it takes to win business" to no avail. Finally, Saylor told Mayhew what it would take to win Strategic Mapping's business.

"I've always wanted to go skydiving, but I never had anyone to go with me," Saylor said.

"You got it," Mayhew replied. "Buy Cabletron MMAC hubs, and I'll pay for the both of us to go skydiving."

A week later Saylor called Mayhew and said he would sign the purchase order for Cabletron hubs with integrated Cisco routing and network management modules right after the two went skydiving.

"I was scared to death the entire time and even left a note for my parents in case I went splat and didn't make it," Mayhew said. "But scared or not, there was no way I was going to blow the deal." — *Laura DiDio*

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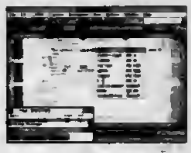

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Restraint governs wireless bidding

By Michael Fitzgerald
WASHINGTON

Gold rush or fool's errand? Bidders in the broadband personal communications services (PCS) wireless auctions said they will practice restraint rather than fall victim to the bidding madness that marked earlier spectrum auctions.

"We're not going to get caught in an irrational bidding war," said M. C. Patrick, a regulatory manager at Pacific Bell Mobile Services, a Pacific Telesis unit that wants PCS licenses in the California regions of Los Angeles/San Diego and San Francisco/San Jose/Oakland.

Indeed, the need for restraints was not evident during early bidding, which kicked off Dec. 5. Two of the 99 licenses for sale in the 51 regions were held by bids of $1,000 after the 12th round was completed, and one of the two licenses in Pittsburgh, a Top 25 market, was held for $410,277. Bidding for all the licenses totaled $956.8 million after the 12th round was completed Dec. 15.

"I don't think the PCS auctions are going to go as high as some thought," said Iain Gillott, an analyst at Link Resources Corp. in Framingham, Mass. Gillott said the billion-dollar prices expected for licenses in New York and Los Angeles did not appear realistic in light of the incremental pace of bidding.

Big score

Still, observers said they expect the Federal Communications Commission to take in several billion dollars when the bidding is complete in early 1995. And vendor sources said they planned to start out conservatively in the open-ended bidding format.

The FCC created PCS to lower costs and bring more features to wireless voice and data markets. The FCC decided to auction off the bandwidth after its experience with creating the cellular market, where licenses for use of the public airwaves were given away via a lottery. Bidding remains open on all licenses until all bids are cast.

Under the FCC's staged bidding structure, the current stage — Stage II — requires vendors to bid on two-thirds of the MHz/percent of the populace they have declared interest in to remain eligible for the auctions.

If bidding remains slow, it could arrest vendor concerns about the potential for expensive licenses, as well as the cost of building the new networks. It may also indicate that PCS will not be the low-cost technology the government envisions.

FCC officials said recently that the actual price of PCS licenses will not matter because multiple vendors are looking to build national wireless networks by combining PCS and cellular licenses as opposed to the duopolies in today's cellular voice and data markets. The auction will "introduce competition in a robust, vigorous way to the wireless communications industry," said FCC Chairman Reed Hundt.

Several vendors said if they do not win licenses in hotly contested areas such as Los Angeles, they would look to alternative strategies to build networks. These could include partnering with winners or targeting smaller chunks of the broadband spectrum that the FCC will auction off in 1995.

Meanwhile, government officials reveled in the beginning of the auctions, which were termed "the biggest sell-off of federal property ever" and a "gold rush."

Sales belie Pentium ills

By Jaikumar Vijayan

For a flawed chip caught in a public relations nightmare, the Pentium processor seems to be doing pretty well.

As the messy controversy over the floating-point flaw begins to simmer down, the market is holding fairly optimistic for Intel Corp.: Pentium sales have so far remained unaffected during the busiest selling season of the year.

Though actual figures are not yet available, anecdotal evidence collected by market research firms indicates that 1994 U.S. Pentium sales will meet analysts' projections of 2½ million to 3 million chips.

A random survey of about 20 large computer retailers around the country conducted by ARS, Inc., a market research firm in Irving, Texas, revealed that overall, the Pentium accounted for 42% of all computer sales during the week of Dec. 19. Pentium-based systems accounted for more than 45% of all the computers sold that same week by the 11 major superstores surveyed.

Interestingly, these figures are significantly higher than the Pentium sales reported by similar stores just before the flaw was revealed.

ARS cautioned that the estimates were based on retailers' perception of sales and focused only on the consumer and small-business markets. So far these segments have accounted for 60% to 70% of all Pentium sales. Actual sales figures for the quarter are not expected until the end of January at the earliest.

"The numbers may be slightly inflated" by the respondents, conceded Phil Magney, president of ARS. Corporate demand could be slowed a bit with concern over the flaw, he added.

The irony of defeat

IBM's decision to temporarily suspend Pentium shipments last week — and the relentless firestorm of negative publicity — has sharply escalated the levels of corporate concern, observers said.

"It has slowed down a few projects; it has created confusion and a lot of activity in the market, but it has not dampened sales," said Tom Taylor, executive vice president of Entex Information Services in New York, a leading reseller to corporate clients.

Ironically, corporate America's slow acceptance of the Pentium could substantially restrict the negative fallout, analysts said. Because most large corporations have few Pentium-based systems anyway, the flaw is likely to cause postponement of orders [CW, Dec. 5] rather than any great shift away from the processor, industry observers said.

In fact, since the flaw was publicized, most major systems vendors, resellers and distributors have steadfastly maintained that the controversy has not dampened demand for the product, especially in the consumer and small-office markets.

Siemens Nixdorf eyes crowded field

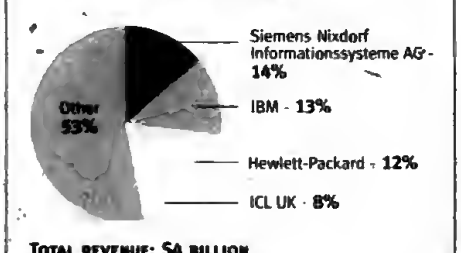
By Craig Stedman

Does the U.S. market need another Unix server vendor? Siemens Nixdorf Informationssysteme AG thinks so, but analysts said it will not be easy for the German company to import its successful European server business into the crowded U.S. marketplace.

Siemens Nixdorf, which started marketing its RM server line here this fall, is not an unknown quantity. It led the European midrange Unix pack in both revenue and unit shipments during 1993 (see chart), according to International Data Corp. in Framingham, Mass. Parent company Siemens AG is one of the world's largest technology vendors with revenue of $54.6 billion in its fiscal year ended in September.

Over there

1993 Western European market share by revenue for midrange Unix systems priced between $100,000 and $1 million



TOTAL REVENUE: $4 BILLION

Source: International Data Corp., Framingham, Mass.

The former Nixdorf Computer even played a bit part in the U.S. proprietary systems market before Siemens bought it in 1990. But the company gave up on the U.S. after that deal, and industry watchers said it will have to give users some very compelling reasons to move from entrenched platforms.

That may not be easy. In a commodity market, it is "kind of tough to say" just what Siemens Nixdorf can bring to the table that is not already available, said Nancy Stewart, an analyst at Dataquest, Inc. in San Jose, Calif. "It's going to be an uphill battle," she said.

Lew Brentano, a vice president at Alliance Development, Inc., a consultancy in Phoenix, said Siemens Nixdorf needs to build up support from resellers and software vendors to become more credible in the U.S.

"I'd like to be real positive and say there's a huge opportunity for them, but it might be three or four years too late," Brentano said. To have a big presence, Siemens Nixdorf has to "find some way to go out and knock a couple of second-tier players out of the market."

Joseph Maguire, vice president of the server division at Siemens Nixdorf's U.S. subsidiary in Burlington, Mass., acknowledged that securing a sinecure here will be a challenge. "We're starting from scratch," he said.

Rather than emphasize technology, Maguire said he hopes to use Siemens' size and name recognition to attract customers concerned with placing their server bets on vendors with uncertain futures. He added that Siemens Nixdorf has a sales goal of just $10 million for the current fiscal year, most of which is expected to come from other Siemens units or European companies with U.S. subsidiaries.

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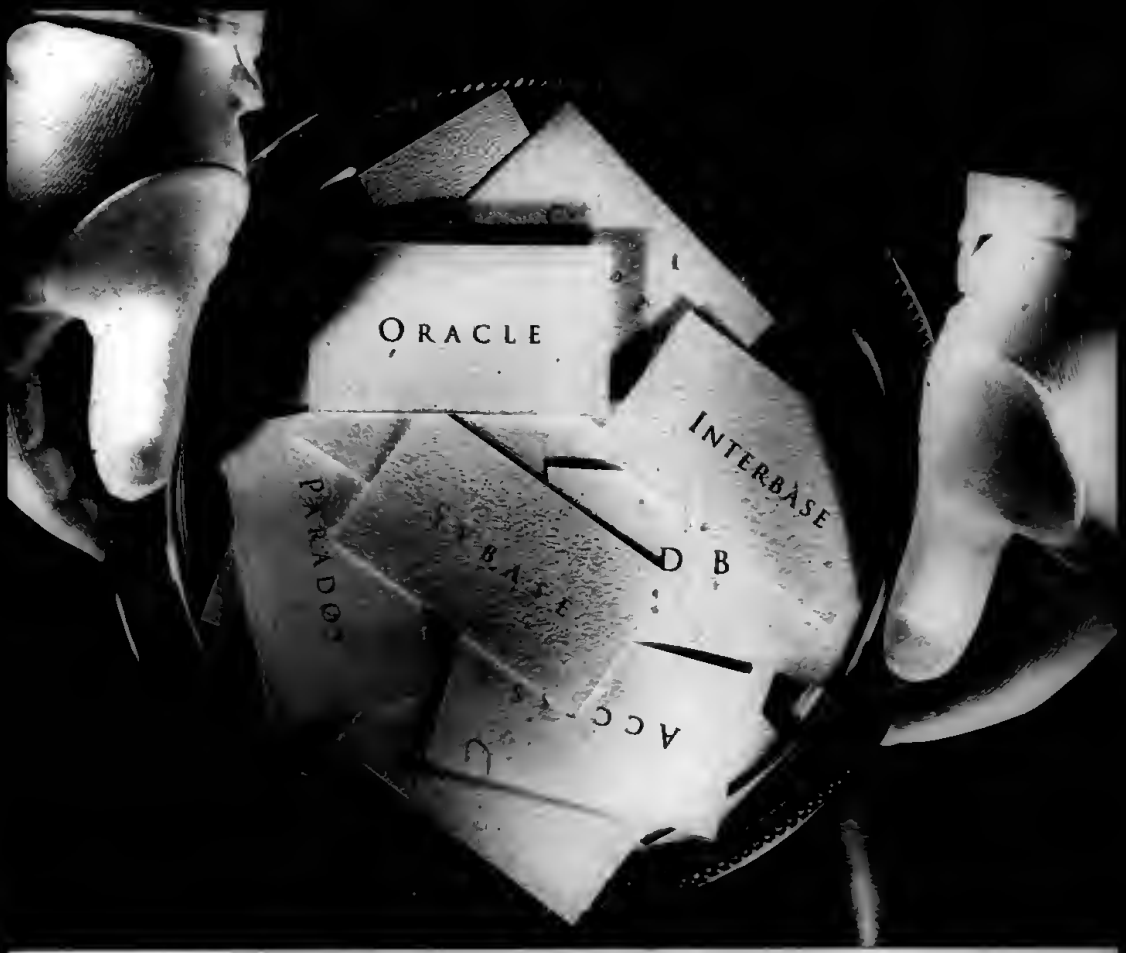

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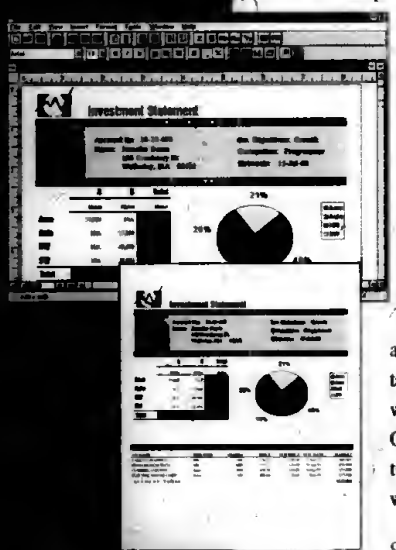

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COMPUTERWORLD

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One heck of a ride

Take a deep breath. If 1995 is anything like the year just concluded, it's going to be one heck of a ride.

When we sat down to pick the top trends for the coming year for this annual issue, four topics fairly leaped out.

First was the information highway. With U.S. [illegible] the mother of all [illegible] to see more sophisticated [illegible] advertising on the 'net and even ways to use your credit-card number on-line with impunity. See our leadoff section, Roadwork: Building the Infobahn, for details.

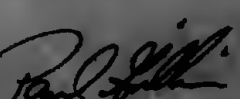
Then there's re-engineering, IS style. Corporate restructuring, decentralization and accountability concerns have IS departments remaking themselves more often than a Transformer toy. What's troubling management is that there's no clear trend here. Decentralization is in, but so is consolidation. Cutting budgets is fashionable, but so is investing in IS for competitive advantage. One thing's for sure: No one has come up with a reliable and cheap way to retrain all those Cobol programmers. Our section on Re-engineering IS offers anecdotes and advice for the confused. You're not alone.

Third, we looked at the client/server industry. IS organizations are throwing past practices to the wind and betting big development dollars on companies that do less business in a year than IBM Dallas does in a day. Now that every vendor is a client/server vendor, the market will begin to pick some winners. Our section on Client/Server's New Order gives you some ideas on who's in and who's out.

And technology-wise, the most interesting developments of the past year or so needs to fit under the seat in front of you. Mobile computing has entered the mainstream, and the pace of innovation will accelerate in 1995. Ubiquitous wireless communication is not too far away, and the laptop is becoming a hub — although only occasionally connected — node on the corporate network. The Disconnected Worker will be your guide to some neat mobile technologies as well as the painfully realistic security risks that accompany them.

And check out a special edition of our technical sections beginning just after the editorial page for a look at other technology areas.

So toast the new year, and fasten your seat belt.



Paul Gillin, Editor
Internet: pgillin@cw.com

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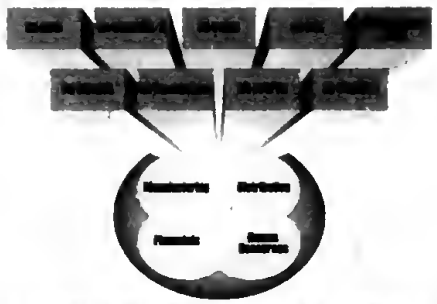

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Roadwork: Building the Infobahn

Never has so much been written and said about something so few people understand. The information superhighway was the computer industry story of 1994. But what the heck is it? Turns out the Infobahn, as it's been nicknamed, is different things to different people. Some of those people will start to make serious money with it in 1995. Read on for tips on translating the lingo and navigating these still uncharted waters.

Cruisin'

Business users will venture onto the Internet in 1995 — but cautiously

By Gary H. Anthes

The first thing you need to know about Internet commerce is that it doesn't exist.

Yes, businesspeople have been sending electronic mail over the 'net for years, and companies have begun putting up home pages on World-Wide Web servers faster than you can say http://www.xyz.com. But if you define commerce as real buying and selling, it is still largely done face-to-face, by voice telephone and "snail mail."

But that should begin to change in 1995.

Companies will continue moving into cyberspace in droves, setting up "dot com," or commercial, accounts. And many will present a digital face to the networked masses via the Web, a hypertext-based system for accessing Internet resources via browsers such as Mosaic.

According to Michael J. Walsh, president of Internet Info in Falls Church, Va., the number of companies with .com addresses will double in 1995 to 50,000, and the number electronically enabled by the Web will skyrocket from 1,000 to 5,000.

Meanwhile, 1995 will mark the birth of real Internet commerce, slowly enabled by new technologies, such as security and digital cash, and leading-edge companies willing to take the plunge.

"The number of transactions consummated on the Internet — as opposed to being facilitated by the Internet — is very small now because the required technology is just starting to filter out," Walsh says. Better security technology, in particular, will arrive on the scene in 1995, he says.

Among the recent events moving the technology along are the following:

- Microsoft Corp. and Visa International, Inc. teamed to develop software that will allow buyers to encrypt credit-card numbers and other information sent over the network.
- Netscape Communications Corp. in Mountain View, Calif., and First Data Corp. in Omaha announced a service by which merchants, banks and buyers conduct commerce on the Internet using encrypted credit-card transactions.
- Open Market, Inc. in Cambridge, Mass., introduced a package of tools for creating and managing an on-line business and a system for processing secure payment transactions, initially by credit card and later by other means including digital cash (see related story page 24).
- First Virtual Holdings, Inc. in San Diego announced a system to match electronic buyers and sellers and process Visa payments without sending credit-card numbers over the 'net.
- MCI Communications Corp. and Netscape introduced an on-line shopping service protected by encryption. The encryption can be activated automatically or by the shopper.

While financial transactions enabled by these developments will begin to flow across the 'net in 1995, most companies will be content to get their feet wet by simply posting information on the Web. GE Plastics, a $6 billion subsidiary of General Electric Co., will begin its first full year on the Internet with 1,500 pages

Life on the Info Highway

Sept. 1, 1969
The first connections are made in the building of Arpanet, the U.S. Advanced Research Projects Agency's computing network.

October 1972
The first public demonstration of Arpanet is given at a conference in Washington.

October 1984
The Computer Fraud and Abuse Act becomes law, making unauthorized access to computers used by the federal government or for interstate and foreign commerce a felony.

1987
The National Science Foundation creates the backbone to the National Research and Education Network. The Internet as we know it is born.

Jan. 22, 1990
Robert Morris, a Cornell University graduate student, is convicted of tampering with a computer and spreading the 1988 virus. Morris is the first person to be convicted under the Computer Fraud and Abuse Act.

Nov. 2, 1988
Almost 6,000 and possibly as many as 250,000 computer systems connected to the Internet, including those at the Department of Defense are attacked by a worm virus.

Feb. 11, 1991
The term "information superhighway" first appears in the popular media as the Bush administration signs on to Sen. Al Gore's idea to develop a high-speed national computer network and a new generation of swift computers.

January 1992
Sen. Gore's High Performance Computing Act to [illegible] provide $3 billion [illegible] over [illegible] to develop a high-speed computer network and support more [illegible] high-performance computing.

of on-line product data for buyers and users around the world.

"A year or so ago, we said to ourselves, 'We haven't changed fundamentally the way we communicate with our customers for a long time,' " says Richard Pocock, general manager of marketing communications at GE Plastics. "And yet, the pace of change in information technology has been extreme. What are we missing?"

After considering a number of options such as CD-ROM, the company decided on the Internet, mostly because of its around-the-world and around-the-clock reach. One month after setting up its Web server, GE Plastics was getting some 12,000 hits a month on its home page from buyers and users looking for information about the company's products.

According to Pocock, GE customers can now get 10 minutes information that would have taken three days via a telephone call and snail-mail delivery. "I believe it definitely gives us a competitive advantage," he says.

Pocock admits it's too early to assess the costs and benefits of the new service, but he says he expects incremental costs to be offset by savings in the printing and distribution of paper products.

GE Plastics' Richard Pocock says the Internet delivers competitive advantage

After setting up its Web server, GE Plastics was getting some 12,000 hits a month on its home page from users looking for information about its products.

"It is only a matter of time before the Internet becomes a very dominant business-to-business communications tool," Pocock says. "We see this as an opportunity to establish a plastics community tied together via the 'net. We want to create a dialogue with a large community that's otherwise difficult to have."

The hitch

Others are less enthusiastic. "We are concerned about [the Internet] evolving into the de facto National Post Office, and we're worried about its ability to scale up, both technologically and administratively," says Ray Hoving, chairman of the Society for Information Management's (SIM) National Data Highways Advisory Council.

Hoving praises Internet architects for taking the network of networks this far, but he and his fellow SIM members worry that as the Internet continues to mushroom, it will grow increasingly unfriendly and its business users will be engulfed by useless information. "They say that out of chaos comes order, but out of order can come chaos," he says.

"Technologically it may be able to scale up," Hoving says. "But imagine the chaos as it becomes an end-to-end commercial marketplace. There's going to be a backlash to all this information overload if it's not managed well."

Hoving also warns of the possibility of a "bait and switch" scenario. He points out that while current Internet use is generally considered cheap or even free, costs could escalate dramatically when the Internet becomes more commercialized.

Despite these concerns, businesses should be exploring the 'net's potential, Hoving says. "My advice is build [security features], get on and surf the 'net," he says. "We [SIM CIOs] have had our heads in the sand about the Internet, and we have to wake up to this."

Follow the leader

Nevertheless, Hoving, director of MIS at Air Products and Chemicals, Inc. in Allentown, Pa., says his company may follow in the footsteps of competitor GE Plastics by putting an electronic catalog on-line.

Hoving says Air Products might move its electronic data interchange applications from a non-Internet network provider to the Internet. But for now, "financial and legal transactions will stay off the Internet until it's proven to be much more secure and an appropriate way to send business transactions," he says.

Menlo Park, Calif.-based CommerceNet, a 62-member consortium of companies interested in electronic commerce, is developing technologies and standards intended to lure companies such as Air Products into the Internet marketplace. "A year from now, there will be Internet transactions that are secure, and there will be some form of payment on the Internet," says Cathy Medich, executive director of CommerceNet. "That's fairly straightforward."

Medich says a CommerceNet working group will set up pilot electronic data interchange (EDI) projects. "Companies see the Internet as a [cheaper way to accomplish] some EDI transactions," she says.

For some users, the Internet offers greater security than traditional means of communication. "We, as lawyers, are well aware of the dangers of misdirected fax's — for example, people winding up with their adversary's game plan," says Kenneth C. Bass, an attorney in the Washington office of Venable, Baetjer, Howard & Civiletti. The dangers of to Internet E-mail are exaggerated, he says. But nonetheless, Bass says he uses a $100 encryption product to protect confidential communications with clients.

Anthony M. Rutkowski, executive director of the Internet Society in Reston, Va., says the group takes unencrypted credit-card numbers from its members over the 'net for conference registration. "As it turns out, not a lot of people are concerned about that any more than they are concerned about using the telephone," he says.

Rutkowski advises companies to get on board the Internet ship. "You basically can't lose," he says. "The cost of a [Web server] is minuscule in terms of its ability to provide services. There is nothing equivalent."

According to Walsh, some network service firms will maintain a Web home page for a company for as little as $25 a month. Costs are related to the bandwidth provided, he says.

Bass says his law firm was the first in the world to set up a Web server. "It has brought us recognition and contacts, and it supplements our traditional publishing activities." ◆

June 1, 1993
President Clinton and Vice President Gore get Internet E-mail addresses.

September 1993
Paramount Communications says it plans to discuss a possible merger with Viacom.

April 1994
"Internet Talk Radio" debuts. Internet users can listen to the weekly, prerecorded, half-hour show and respond via E-mail.

March, 1994
President Clinton visits Silicon Graphics; a digitized version of the video feed is simultaneously made available to employees who watch from their workstations and to those on the Internet with the necessary hardware and software.

Sept. 20, 1993
QVC Network launches a $9.5 billion hostile takeover bid for Paramount. The company proposes to pay for the acquisition in cash.

Oct. 13, 1993
Bell Atlantic announces its plan to acquire Tele-Communications, Inc. (TCI) in a deal valued at $33 billion. It would be the largest merger in history.

Dec. 16, 1993
Yes, Virginia, there really is a Santa Claus. Delphi Internet Services offers E-mail service to Santa at the North Pole. Santa's box gets 800 messages in four days.

November 1993
PacTel Cellular announces its plan to spend $16 billion on the information highway.

January 1994
MCI Communications announces its plan to spend [illegible] over a six-year period to [illegible] an international information [illegible].

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PLAYING IT SAFE

Security and reliability worries spark a boom in private commercial services

By Erin Callaway

Larry Goode

Before you set up shop on your own Internet host, consider this: a new breed of companies is emerging to offer merchants the tools to build on-line storefronts *and* the networks on which to put them. They're also promising a reasonable degree of security on an inherently insecure network. But more users will have to sign on to the idea before it is clear how successful these services will be.

For example, Open Market, Inc. in Cambridge, Mass., has created a forum for electronic commerce complete with a security system that "challenges" customers to identify themselves with personal information before they can complete transactions.

"When customers open an account, instead of passwords that can be easily memorized, we ask them for information only they can know," explains Shikhar Ghosh, chief executive officer of Open Market. "We use things like their pets' nicknames or their favorite color or movie," he says.

Secure enough?

Open Market is geared toward merchants who want to sell everything from $2 documents to $1,000 software. The difficulty and number of challenges the system poses correlates to how much money is transferred and the value of the goods being sold.

In addition to the challenges, Open Market issues one-time-use personal identification numbers and smart cards for higher-level transactions. While Ghosh says he is confident these measures are appropriate, it will take actual commerce on the system to show whether customers will tolerate them.

Ed Parkin, senior director of enterprise information services at Mead Data Central in Dayton, Ohio, says Open Market's thoroughness in dealing with security is one reason his company is considering doing business with them.

"They have really thought through billing, tracking and protecting intellectual property, which seems to be an afterthought at some other companies," Parkin says.

According to Ken Cutler, vice president and director of the Information Security Institute in Woodbridge, Va., talking about security is a start, but it is not enough. "These guys are potential hired guns. You have to assume that anything you do across the Internet is totally at risk," he says.

To protect themselves, Cutler says on-line merchants should make sure they negotiate a contract that includes specific references to the security measures being offered. More important, the contract should clearly outline who will be responsible for damages if a system is violated.

"You can gauge how trustworthy these people are depending on how far they are willing to walk the plank in a contract," Cutler says. "Not only should they arrange for regular audits themselves, but they should be willing to submit to audits arranged by the merchants as well."

First Virtual Holdings, Inc. in Cheyenne, Wyo., has tailored its first electronic marketplace to merchants who want to sell information such as electronic publications. Its security system uses Internet electronic mail to authorize transactions but relies on the tenet that a few "freebies" here and there are good advertising for information sellers.

In fact, First Virtual's chief scientist, Nathanial Borenstien, says merchants' conventional method of giving potential customers just a piece of the information they want to buy isn't adequate.

"Of course we expect customers to pay for what they download," Borenstien says. "But you can't truly evaluate information until you see the whole package. On our system, that means you either own it or you don't."

First Virtual bans customers from shopping on the network if they abuse the privilege of obtaining merchandise before they pay. Likewise, customers have the right to refuse payment if their account is used fraudulently. However, the system tracks how often they register such complaints and boots them out if they lodge complaints excessively.

Positive results

Michael J. Walsh, president of Internet Info in Falls Church, Va., sells market research on business use of the Internet through both Open Market and First Virtual. Although the companies are brand new, so far, Walsh says he's pleased with what he's found there.

"I figured it would be like being the only store open in a huge mall," Walsh says. "But even though I didn't expect a lot of shoppers right away, I've already had a couple of dozen sales between both systems in just a few weeks."

Walsh did suggest that both companies have to smooth some edges to make their systems more appealing to people who aren't used to the Internet, but he says they seem to be making the right strides. "They'll definitely attract the 'netizens' of the world," he says.✦

Feb. 24, 1994
The TCI/Bell Atlantic merger is officially pronounced dead.

April 19, 1994
The New York Times calls the information highway the "infobahn."

Jan. 11, 1994
Vice President Gore makes his debut on the Internet in a 45-minute, real-time conference sponsored by U.S. News & World Report in conjunction with CompuServe.

July 6, 1994
Stockholders approve the Viacom/Paramount merger.

November 1994
Commercenet, a consortium of companies starting to do business on the Internet, receives the Pacific [illegible] California [illegible] and [illegible] Network, or CalREN, award, a $20,000,000 grant to facilitate Internet connectivity and electronic commerce.

Jan. 24, 1994
In a Computerworld column, Esther Dyson writes, "I am supposed to give the U.S. government advice about defining and regulating the National Information Infrastructure (or leaving it alone). Presumably, I should represent someone, but who?"

October 1994
The White House "home page" debuts on the Internet. An estimated 1,300 people an hour take multimedia tours of the nation's capital. The biggest draw: sound bytes of the Clintons' cat, Socks, meowing on-line.

July 21, 1994
McDonald's runs the first on-line ad in its six-week campaign on America Online.

— Compiled by Erin Callaway

Sources: Business Week, The New York Times, The Wall Street Journal, Time, Forbes, CNN Newsstand, The Internet For New Users by Daniel P. Dern, Electronic Messaging News, Computerworld and the White House media office.

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10 Manufacturer (other than computer)
20 Finance/Insurance/Real Estate
30 Medical/Law/Education
40 Wholesale/Retail/Trade
50 Business Service (except DP)
60 Government - State/Federal/Local
65 Communications Systems/Public Utilities/ Transportation
70 Mining/Construction/Petroleum/Refining/Agric
80 Manufacturer of Computers, Computer-Related Systems or Peripherals
85 Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
90 Computer/Peripheral Dealer/Dist./ Retailer
95 Other _____ (Please Specify)

2. TITLE/FUNCTION (Circle one)
IS/MIS/DP MANAGEMENT
19 Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Management
21 Dir./Mgr. MIS Services, Information Center
22 Dir./Mgr. Network Sys., Data/Tele. Comm., LAN Mgr. /PC Mgr. Tech Planning, Admin. Services
23 Dir./Mgr. Sys. Development, Sys. Architecture
31 Programming Management, Software Developers
41 Engineering, Scientific R&D, Tech. Management
60 Sys. Integrators/VARs/Consulting Management
CORPORATE MANAGEMENT
11 President, Owner/Partner, General Manager
12 Vice President, Asst. VP
13 Treasurer, Controller, Financial Officer
DEPARTMENTAL MANAGEMENT
51 Sales & Mktg. Management
70 Medical, Legal, Accounting Management
OTHER PROFESSIONAL MANAGEMENT
80 Information Centers/Libraries, Educators, Journalists, Students
90 Other Titled Personnel

3. Do you use, evaluate, specify, recommend, purchase (Circle all that apply)

Operating Systems
(a) Solaris (e) Mac OS
(b) Netware (f) Windows NT
(c) OS/2 (g) Windows
(d) Unix (h) NeXTstep

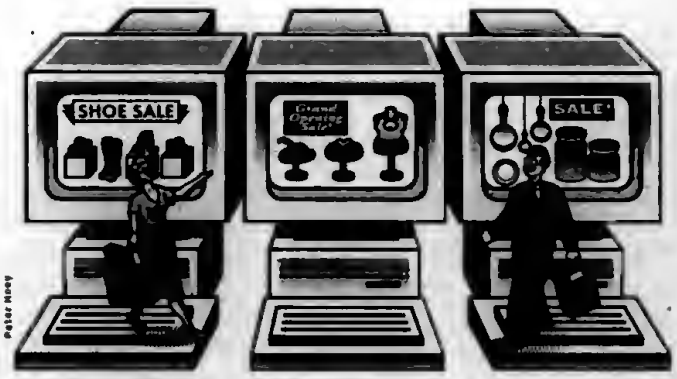
App. Development Products ❑ Yes ❑ No
Networking Products ❑ Yes ❑ No

COMPUTERWORLD

Down to the

Putting your sales on-line may have an unplanned impact on your bottom line

By Michael Sullivan-Trainor



Just before Thanksgiving, Dave Bailey, a senior marketing analyst at United Parcel Service, Inc. in Atlanta, wasn't thinking about turkey. Instead, he was counting transactions. UPS had just entered the on-line world with an electronic storefront on CompuServe. Twenty to 30 transactions were logged during the first few days of test runs, and Bailey was awaiting the storefront's grand opening. That's when the services would be announced on CompuServe's What's New area.

In December, the company opened a storefront on Prodigy, and shortly, customers will be able to arrange for UPS package deliveries through America Online and the Internet.

Bailey has some advice for other large companies that want to follow UPS's lead. "You need buy-in throughout the whole organization before you give customers electronic access to your services," he says.

As companies gear up to open on-line sales channels, they should beware of expectations that on-line storefronts will be like their off-line counterparts. Special attention must be paid to an interactive presentation and smooth back-end order fulfillment.

The first question many companies ask about going on-line is, Will it be worth it? In UPS's case, Bailey says it will be less expensive to sell services on-line than through normal channels. He also expects to generate new business.

"Having an on-line presence directly targets those who are less frequent users of our services and gives them unique access to UPS," Bailey says. "Our competitors aren't on-line yet, and that gives us an edge where we can generate some allegiance to our service."

The firm now targets high-end customers — those who send 50 or more parcels a week — through intensive marketing, but there are no major efforts aimed at getting infrequent users to use the service more often.

Bailey says on-line users will become more aware of UPS through the company's on-line presence than through normal marketing efforts. He also sees them using the company's services more readily than competitors' because on-line access will be easier.

At 800-Flowers, one of the many small company on-line success stories, Ellaine Rubin, manager of interactive services, says selling on CompuServe saves the company 10% to 30% — primarily by cutting out direct mailings and phone operators. In addition, 5% of the firm's $100 million in revenue is generated via on-line orders.

"We are definitely acquiring new customers and having current customers purchase more cost effectively on-line," she says, "It's also easier to keep in touch with them."

New customers

JC Penney Co., which has been selling on Prodigy for five years and on CompuServe for four, nets a "very small" revenue stream from its electronic storefronts, according to Marisha Konkowski, new business development project manager for electronic retailing. But the company is happy with its on-line effort because it targets a different set of customers than the traditional, primarily female population that uses the retailer's catalog.

From a technical standpoint, preparing a firm to sell on-line is fairly straightforward. But gaining understanding and commitment from different parts of the organization is far from simple. Two areas where the company has to agree on presentation and process are the following:

- A storefront that presents the company's products and services in an easy-to-access, interactive and dynamic format. This can range from mostly text descriptions to full-fledged graphical presentations.
- The back-end connections that allow a customer's order to be quickly logged, filled and tracked by the organization. At worst, these connections can involve downloading orders from the storefront and rekeying them into back-end systems. At best, they link customers to fulfillment so that customers supply all the necessary demographic and credit-card information directly into company systems.

"Few companies have the back end waiting," says on-line consultant Richard Masterson, a principal at Mastersmith, Inc. in New York and Philadelphia. "Everybody has their eyes on the front door and how they can make it attractive."

Ample hardware platforms, development tools and networking options are readily available today. As with many IS projects, the devil lies in obtaining internal agreement. Sales and marketing must determine what the storefront looks like. Operations must decide how the back-end process works; and senior management must assign sufficient resources to get the job done.

"Our biggest challenge has been putting together a team," says Diane Solberg, electronic media merchandising coordinator at mail-order company Lands' End, Inc. in Dodgeville, Wis., which has been a CompuServe Electronic Mall resident since March 1993.

Lack of commitment to on-line projects can be a major stumbling block to success. "Many companies start with a high level of support, but six to eight months into the project, they're delighted to assign it to a part-time summer intern," says Keith Arnold, general manager of the Electronic Mall on CompuServe.

The 150-store mall — the oldest on-line sales presence — opened in 1985. Occupants include JC Penney, Sears, Roebuck and Co., Lands' End, Brooks Brothers, the Metropolitan Museum of Art and 800-Flowers.

Like UPS, Lands' End is branching out with moves to Prodigy, CD-ROM marketing on the Internet and participation in interactive pilot projects such as Star Gazer from Bell Atlantic Corp. in Arlington, Va.

With more than 6 million users of commercial on-line services now and more than 13 million expected by 1998, environments such as CompuServe, Prodigy and America Online are secure, structured proving grounds where companies can experiment with on-line sales and target audiences. CompuServe claims 2 million users, mostly businessmen; Prodigy claims 2 million users, with more women and children than CompuServe; and America Online claims 1 million users and a younger, more consumer-oriented crowd.

> **"Many companies start with a high level of support [for on-line projects], but six to eight months into the project, they're delighted to assign it to a part-time summer intern."**
>
> — Keith Arnold, general manager, CompuServe's Electronic Mall

There are also a host of new services for setting up on-line storefronts coming in 1995, including Microsoft Corp.'s Microsoft Network, formerly code-named Marvel.

"A year from now, we'll probably still be experimenting with different things," Solberg says. "We want to see what customers react to. It's hard to see what's going to hit or miss."◆

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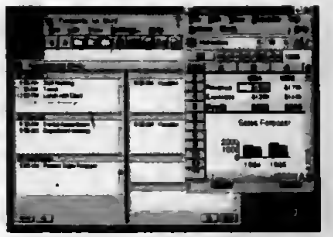

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What You Don't Know

Privacy advocates can help navigate the mine-laden territory of consumer databases

Katherine Lambert

Bell Atlantic's Edward Young says hammering out the privacy code was a 'very difficult' process inside the company

By Mitch Betts

One way to make big bucks from the information superhighway is to compile detailed information on how consumers use on-line services. Then exploit this consumer "profile" for targeted marketing, promotions and cross-selling campaigns.

But in these privacy-sensitive times, that business model is also the fastest way to get blasted by politicians, the press, privacy advocates and the very consumers who services want to lure.

Just ask America Online, Inc., which was nailed last October by U.S. Rep. Edward J. Markey (D-Mass.) for trying to sell its subscriber data to the direct marketing industry.

"There is the potential to make a ton of money [selling on-line subscriber data], but this is an area where companies need to tread very carefully," warns Mary J. Culnan, an expert on consumer privacy at Georgetown University in Washington. By tracking every touch of a button, "these systems have an enormous potential for surveillance," she maintains.

Tiptoeing through minefields

Aware that a single slipup in the field of consumer privacy can be a public relations disaster, savvy companies are hiring consumer advocates and drafting confidentiality codes to navigate the privacy minefield.

The reason is not so much altruism as it is a marketing imperative. "Who will want to use our on-demand movies service if the list of movies they watch will be distributed elsewhere?" says Edward D. Young III, associate general counsel at Bell Atlantic Corp.'s Arlington, Va., office, which plans an interactive network.

Indeed, a recent public opinion poll found that the types of consumers who are prime targets for the new wave of interactive services — including people who like home-shopping services and watching movies, for example — are the same ones who expect some privacy for their on-line activities.

"To sell them, it's necessary to reassure them," says Humphrey Taylor, chief executive officer of the polling firm Louis Harris and Associates, Inc. in New York.

Of course, consumers are a pragmatic bunch. If you give them a big enough discount to divulge their life story and a say in how that information will be used, they will go along.

What consumers want is *advance* notice of the data collection and how it will be used, the poll found. They also want some control over the types and timing of the advertising messages, and they want to be able to review and correct their data profile.

Getting an edge

In fact, vendors who take a pro-privacy stance may get a competitive edge. "Fair information safeguards may be the very best marketing message for interactive services," says Alan F. Westin, a professor at Columbia University in New York and mastermind of the poll.

The survey found that, so far, consumers are willing to let vendors self-regulate their behavior. "But the American public has a short fuse on this," Westin warns. Political pressure for a federal privacy board to oversee industry practices and act as a consumer ombudsman is a distinct possibility.

So it is not surprising that information-intensive companies such as American Express Co., Pacific Bell, Equifax, Inc., BankAmerica Corp. and Bell Atlantic have adopted privacy codes to address consumer concerns.

Bell Atlantic's policy was triggered in part by bruising battles with privacy advocates and regulators over the Caller ID service a few years ago. Now the company wants to take a more proactive approach and consider privacy implications *before* it rolls out interactive services, Young explains.

But Young acknowledges that hammering out the privacy code was a "very difficult" process inside the company. Typically, the tension is created by the fact that a company's marketers want maximum exploitation of consumer data to ensure the new venture will be a financial success.

By having a privacy advocate on board, the company gets an opposing viewpoint and some expertise about how other companies deal with privacy issues. "You certainly need to have people who will examine things from the customer point of view, not just the financial point of view," Young says.

The corporate privacy policies are not as strong as public interest groups might like, but they are a step in the right direction, says Marc Rotenberg, director of the Electronic Privacy Information Center in Washington.

"The good news is that these companies are becoming sensitive to consumer concerns and are trying to get ahead of the curve on this issue," Rotenberg says. "The bad news is that Washington hasn't caught up."

He says the Clinton administration task force that is drafting privacy guidelines for the National Information Infrastructure has "missed the boat," producing a weak-kneed set of guidelines that give consumers little or no protection.

Policy is no panacea

However, the Clinton administration did have the foresight to establish the task force and try to address the issue before some large-scale privacy disaster occurs.

Many companies have no comprehensive privacy code at all. They drift along with ad hoc decisions until some public relations crisis occurs, and then they scramble to write some privacy rules, according to the book *Managing Privacy* by H. Jeff Smith at Georgetown University.

Of course, having a policy is no panacea. Smith's book points out that many companies have a big gap between their printed policies and their actual practices. Experts warn that business pressures, untrained employees and lax oversight can all lead to privacy abuses — and it will only take a few highly publicized horror stories to make an already-cynical public leery of driving the information superhighway.◆

HIGHWAY RULES

A summary of Bell Atlantic Corp.'s new customer privacy policy

1

2

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4

5

6

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GET Wired

We dig through today's on-line services looking for IS nuggets so you don't have to

By Ellis Booker

Even if commercial networks carry out their pledges to become permeable to the Internet, the variety of on-line options will continue. Commercial networks will be able to give their subscribers services the Internet cannot, as well as a consistent user interface, well-run technical forums and distinct user populations.

Details change from week to week, but here are some of your top commercial options:

AMERICA ONLINE, INC. (AOL)

(800) 827-6364

Cost: $9.95 per month for five hours, including Internet services.

Access speed: Up to 28.8K bit/sec.; ISDN access coming in the first quarter of 1995.

Internet strategy: Access to Usenet newsgroups, Wide-Area Information Server and gopher databases. FTP access and plans for a World-Wide Web server.

Interface: A slick multimedia interface began shipping in 1994. Ranked easiest to use of the Top 3 commercial networks.

Population: The company estimates it will hit 2 million subscribers by next summer.

For IS professionals: AOL has been aggressively pursuing its Internet strategy through the acquisition of software companies as well as through the $35 million acquisition of Advanced Network & Services, Inc., which had managed the Internet's network backbone for the National Science Foundation.

Overall grade: A

PRODIGY SERVICES CO.

(800) 776-3449

Cost: $9.95 for five hours; extra hours $2.95.

Access speed: 9.6K bit/sec.; support for 14.4K bit/sec. slated for early 1995.

Internet strategy: On Nov. 1, Prodigy launched AstraNet, a separate Web service with a mix of free and paid services. That same month, it bundled a Web graphical browser into its service.

Interface: Some like it; many do not. Prodigy's big, bold graphics can make the service feel toy-like. But the look is being upgraded. In November, for instance, Prodigy finally did away with its 40-character E-mail screen.

A bigger problem is the service's speed, which even at 9.6K bit/sec. is sluggish.

Population: 2 million

For IS professionals: Unquestionably the most consumer-oriented service, Prodigy is generally not seen as a habitat for IS professionals. On the other hand, it is arguably ahead of both AOL and CompuServe in making its service permeable to the Internet. This could be its strong suit.

Overall grade: B-

COMPUSERVE, INC.

(800) 848-8199

Cost: $8.95 per month for unlimited connect time to basic services. Extended services cost $4 per hour and up.

Access speed: 14.4K bit/sec.; 28.8K bit/sec. planned for first half of 1995; ISDN access in late 1995.

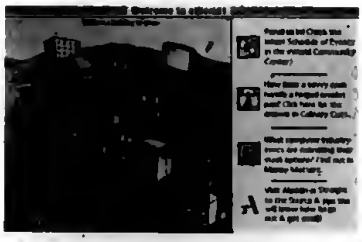
Internet strategy: An FTP service; a Web page coming. Members can log on to the service via the Internet and Telnet to the Internet from within CompuServe. Access to Internet FTP sites from within CompuServe was added in November as was an agreement with Spry, Inc. to let users connect to the Internet via CompuServe's 400 worldwide nodes.

Interface: Icon-based, enhanced menus in the FTP service telegraph the direction for CompuServe's Windows-based CompuServe Information Manager.

Population: 2.4 million

For IS professionals: CompuServe has a deserved reputation for the strength of its 700 vendor forums, which continue to be some of the best places to find technical information and support. However, now that virtually all hardware and software companies have Internet connections, CompuServe's dominance could decline. Speed-based pricing for Internet access is due for a change because it penalizes users who access the Internet at high speeds.

Overall grade: B+



E-WORLD

(800) 775-4556

Begun in June, E-World (a unit of Apple Computer, Inc.) targets devotees of Apple products.

Cost: $8.95 per month buys two hours, after which use is billed at $4.95 per hour. A promotion through February offers 10 free hours.

Access speed: 9.6K bit/sec. with plans for 14.4K bit/sec. in the first quarter.

Internet strategy: Support for Internet E-mail; Usenet newsgroups will be available sometime in 1995.

Interface: E-World's front end is its strongest feature. Users are presented with a highly graphical, logically organized "city" in which locations (buildings, newsstands, etc., are the doors in to services). The software is now exclusive to the Macintosh, but a Windows version is expected in 1995.

Population: Not provided.

Overall grade: Too early to tell.

INTERNETMCI

(202) 887-2442

Already a major carrier of Internet traffic, MCI Communications Corp. in November announced plans for InternetMCI, a service with its own client software. Available in January, InternetMCI will offer a portfolio of informa-

tion, shopping and news services via its own service, MarketplaceMCI.

There is a onetime access charge of $18.95 and $19.95 per month for seven hours of use. The installation cost is $300 per circuit for dedicated access; monthly port charges range from $1,000 for 56K to 64K bit/sec. to $2,300 for T1 speed (1,536K bit/sec.).

Access speed: For business customers, MCI will offer access speeds ranging from 9.6K bit/sec. all the way up to Asynchronous Transfer Mode (ATM) running at 45M bit/sec. Dial-up speeds are 14.4K and 28.8K bit/sec., with plans for ISDN in 1995.

Internet strategy: Support for Internet E-mail, a listing of Web pages, shopping from electronic storefronts.

Interface: MCI's client software is derived from Netscape, a graphical Internet browser from Netscape Communications, Inc. (formerly Mosaic Communications, Inc.).

Population: Not available.

Overall grade: Too early to tell.

INTERNET

Contact any of the many local and national Internet access providers.

Cost: Dial-up access to the Internet comes in the following two flavors:

- A shell account, in which a user signs on to an Internet access provider as a terminal. Prices for limited-use shell accounts are as low as $10 per month.
- A Serial Line Internet Protocol or Point-to-Point Protocol interface in which the user's PC has its own unique IP address on the Internet. These connections permit use of graphical browsers such as Mosaic.

Internet software ranges from free to $200 and access deals for 14.4K bit/sec. cost as little as $25 to $30 per month for unlimited access.

Access speed: Mosaic requires a minimum 14.4K bit/sec. modem. A few Internet providers plan to offer ISDN Basic Rate Interface (64K bit/sec.) support and vow to price it close to what 14.4K bit/sec. costs today.

Interface: A plethora of software is now available that establishes the required TCP/IP stack on your PC and provides Internet utilities such as FTP, Telnet and gopher.

Population: Estimates vary from 25 million to 30 million.

For IS professionals: Many IS professionals are finding much of what they need on the Internet. The key here is "finding." Riches are often buried, known only to the experienced few. The best advice is to ask for advice. New users should also subscribe to the appropriate list servers and Usenet newsgroups and scan them often for information.

Keeping up with Web developments is more difficult because these multimedia-capable servers are growing by 200 sites per week. The best source of information on new Web sites is the National Center for Supercomputer Applications' What's New home page (http://www.ncsa.uiuc.edu:80/sdg/software/mosaic/docs/whats-new.html).

Overall grade: B+ ✦

Skills for an On-line Age

Interconnected networks will create demand — and opportunity — for people with the right training

By Jodie Naze

Job descriptions are still fuzzy and duties overlap in the on-line age, but that's expected to change.

As use of the Internet and other on-line resources shakes out, roles and responsibilities will become more defined. For now, the following jobs are taking shape:

Internetwork engineers

The number of nets wanting to use TCP/IP is expanding much faster than the number of people who understand it technically. "Even prepackaged IP software occasionally needs specialized configuration," says John Quarterman, a founding partner at Texas Internet Consulting in Austin.

Internetwork engineers often handle a variety of tasks, such as setting up prepackaged dial-up software, customer support for service providers and design and installation of networks and applications.

"People who can grasp the broad requirements of a WAN and still relate it to the specific user requirements to provide connectivity at the desktop will fare well," says Greg Musat, information systems recruiter at AJM Professional Services in Troy, Mich.

Security experts

Most of the responsibility for security will fall into the laps of current IS staff, Quarterman says, but firms wanting a higher degree of protection will continue to hire experts.

Hugh Watkins, a systems engineer at Delta Air Lines in Atlanta, for example, is heavily involved with Internet security.

> WANTED: Internet specialists. Experience with World-Wide Web, knowledge of navigation techniques including gopher, Telnet and Mosaic and familiarity with Unix required.

"We want to be careful that we don't let people [access] our internal network from the Internet," he says.

"Careful" means building a firewall machine between Delta's internal network and the Internet and configuring and setting up domain names. In addition to intensive amounts of logging activities, the job requires a heavy Unix and networking background. "You must have the ability to diagnose TCP/IP problems as well as Unix configuration problems," Watkins says.

Mobile computing technicians

While support staffs wait for the needs of mobile users to become more like those of local users, there will be opportunities for experts in remote access, says Cheryl Currid, president of Currid & Co. in Houston.

Necessary skills include an aptitude for various dial-up and wireless telecommunications options and procedures, troubleshooting hardware problems over the phone and developing scripts to automate dial-up and log-in procedures.

Internet specialists

These experts help companies creatively use the Internet to meet business needs and project the business onto the Internet.

To fulfill this role, job candidates must be able to build World-Wide Web pages and have the capacity to monitor news groups and disseminate information. "Not only should they be able to skillfully retrieve information from the various news groups, but they must also be able to put quality materials onto the Internet," says John Makulowich, vice president of The Writers Alliance, Inc., an Internet training and educational writing firm in Gaithersburg, Md.

Experience with resources such as the World-Wide Web, knowledge of navigation techniques including gopher, Telnet and Mosaic, and familiarity with Unix is critical.

Information librarians

Cyberians use computers to get into and seek information from on-line services. Required skills include experience with navigation techniques including gopher, Telnet and Mosaic; expertise in the DOS/Windows PC environment; and in-depth knowledge of electronic searching techniques, especially textual databases.

Trainers

Trainers of on-line resources, especially the Internet, are in demand. "It's an entrepreneurial phenomenon," Makulowich says. Skills required include a knowledge of the various on-line services, the ability to simplify complex concepts and a knack for standing in front of a class.

Wordsmiths/graphics specialists

Companies that want an established Web presence will need people who can present information graphically and create readable documentation. ✦

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coming at client/server groups from the glass house. No more client/server people lobbing grenades at the MIS staff. Not that peace is always as peaceful as you'd like it to be. Networks going down, bottlenecks popping up, people screaming about applications they can't get to. And a nasty feeling that nobody is really doing anything to help you with any of it. When, in reality, all of us at Legent are doing quite a lot. We've put together the most extensive set of industrial-strength, distributed systems management tools available. We've also developed an open architecture called XPE™ that lets our software work together across almost anything you can wire together, regardless of function or platform, from mainframes to UNIX servers to PC LANs. Which means you can manage your systems from the platform of your choice, something our customers tell us they're happily doing right now. It's not a silver bullet, but it can definitely help you do your job better. Besides, it's peacetime. Who needs bullets?

THE FIVE MILLION CHANNEL MAN

The Internet will be bigger than anyone imagines

Much of the technology that will show up on the information highway tomorrow is being done at the MIT Media Lab today. Nicholas Negroponte, the lab's globe-trotting director, recently took time out for a virtual interview with *Computerworld*'s senior editor William Brandel over the internet.

COMPUTERWORLD: There has been phenomenal growth in usage on the Internet in the past year. Yet the Internet has been around for years. What can the Internet allow people to do today that they could not do, say, a few years ago? Why all this growth now?

Alfred Stelton/Ubermorgen/Courtesy of MIT Media Lab

NEGROPONTE: Let me start by saying that I think the Internet is one of the rare, if not unique, instances where "hype" is accompanied by understatement, not overstatement. I estimate that the 'net (or whatever it is called) will have 1 billion users by the year 2000. I don't think we know what has hit us.

Exponential growth in PCs has now created a critical mass that was missing as recently as three years ago. In 1990, companies such as IBM and Apple looked at the home market as a nonmarket. Today, almost 70% of all PCs are being shipped into the home.

As Andy Grove [chief executive officer at Intel Corp.] points out, in two years we make as many computers as existed in all preceding years. We really don't understand exponentials clearly. It's like working for a penny a day at the beginning of January and doubling your salary each day for that month. You are earning more than $10 million on the last day. That is what is happening with the 'net: We're in the equivalent of the last days of January.

The 'net is not about information providing. It is about community. Without the current presence of computers in the home, this community just did not exist.

COMPUTERWORLD: Is the internet the information superhighway? Should it be?

NEGROPONTE: Whether or not the current Internet *is* the information superhighway or not is less important than the fact that it *is* an excellent model for it. This is true in the following three ways:

- It has no centralist control.
- It has sealed well (so far).
- It does not know you are a dog.

There will need to be all kinds of verification, privacy and digital cash invented for the 'net to be used as a real "highway" (awful word). But that will happen rapidly.

COMPUTERWORLD: Is all the hype surrounding the Internet good for it? Are there downfalls?

NEGROPONTE: The hype is just fine. Whether the hype comes from an enthusiastic vice president or "the media," it raises the public's awareness of a new medium. The 'net has many harmonizing and decentralizing propensities that are just great.

Multiuser Dungeons [MUDs] and object-oriented MUDs are an example of a new form of entertainment (sometimes called a "third place"). I believe more people will be entertained by the 'net than by looking at "network" television by the year 2000. Odd how the "networks" used the word "network" so badly.

COMPUTERWORLD: There has been a spike in the user population on the Internet recently. Yet there does not appear to be any centralized control or method to the madness, if you will. Is there some controlling mechanism that is not apparent? If not, what are the implications of the random growth on the Internet?

RIDDLE: Why is the Internet an excellent model for the information superhighway?
ANSWER: It has no centralist control. It scales well (so far). And it does not know you are a dog.

NEGROPONTE: The growth is no more random than a flock of geese, where no goose is in control. (Most people think the lead goose is guiding; it is not.) See Mitchel Resnick's book, *Turtles, Termites and Traffic Jams* [MIT Press, 1994]. This is good, not bad.

The part that feels like "madness" is the economic model, which none of us understands clearly. It calls into question the advertising model of entertainment that is considered so fundamental to TV but is absent in books, for example. [Futurist] George Gilder is fond of calling books a medium "of choice," and he is right!

COMPUTERWORLD: Should business look at the Internet as a medium for commerce? Is it possibly a hostile environment for business? Does it offer the profit yield that some companies are reaching for?

NEGROPONTE: Of course business should look at the 'net as a medium for commerce. This is particularly true if you make bits, not atoms. The 'net is neither hostile nor friendly, as much as it changes the rules.

All of a sudden, little companies can behave like big ones. Being large has less commercial advantages than it did before. Intellectual property changes meaning. "Out of print" no longer exists. And on and on.

COMPUTERWORLD: What will we be able to do five years from now on the Internet? Home shopping? Download movies? Interactive video? Five hundred channels? Home security?

NEGROPONTE: All of the above and more; not 500 channels, but *5 million*. The way to think about the 'net is to compare it with the technologies of "push" as we know them today in newspapers, magazines and television. The 'net will be the technology of "pull" tomorrow, where people reach into it or have their intelligent agents do so on their behalf. Today, this is manifest by browsing tools. Tomorrow it will be agentry.

COMPUTERWORLD: Look at what *Wired* has done to make heroes out of people who earlier would have been categorized as "propeller-heads" or "geeks." What role has the Internet played in this image transformation? Is this good? Could the media also be lionizing a society that is shying from face-to-face communication?

NEGROPONTE: *Wired* has not made "heroes" out of "geeks"; it has presented a new voice and is recognizing a lifestyle and culture that is transnational, highly generational, more like rock music than Catholicism.

Any electronic medium that removes space and time as serious constraints has the terrific effect of enhancing face-to-face communication. For myself, I find face-to-face communication used for far more important interpersonal relations than before. America could be 50% more productive (whatever that means) if corporations trashed 90% of the meetings they hold. Most of that can be done far better in cyberspace.

COMPUTERWORLD: Name two projects in the MIT Media Lab that will be in use in the next couple of years.

NEGROPONTE: There are dozens; here are two. One is Ringo, an agent that helps you select music. This simple program will grow rapidly and be used for books, movies and restaurants. Another is NIF (News in the Future). Already some of the 19 newspaper sponsors of NIF are experimenting with real systems.

COMPUTERWORLD: Do you think the "change in guard" in Washington will impact the information superhighway?

NEGROPONTE: I don't think Washington has much of an effect on the 'net. This is a phenomenon that will grow in spite of regulation and needs no incentives. Government support helps a little and lack of support will hurt a little, but the key word is "little." This is a global phenomenon, not national (the N in NII [National Information Infrastructure] is just silly), fully in play and far beyond any point of return.✦

What the Infobahn Means to Me

CIOs and CEOs respond

Douglas Fields
Vice president of telecommunications
United Parcel Service of America, Inc.
Mahwah, N.J.

The information highway is...
"...a concept to create a dynamic infrastructure that would be useful for business, citizens and national institutions to conduct their affairs. Physical manifestations might include high-speed linkages between different sources to every conceivable user."
For my company it means...
"Our strategies are twofold: to use existing technologies to meet our tactical needs and to stay close to the major telecommunications vendors to leverage their services."
In the coming year...
"I don't think anything is going to happen in 1995. Telecommunications providers are clearly moving in the direction of global networks and capacity on demand."

Tim O'Reilly
President
O'Reilly & Associates, Inc.
Sebastopol, Calif.

The information highway is...
"...the present Internet and the way it's developing. There are forces pushing in the direction of centralization, such as the cable companies, but the Internet is a better model because it's distributed, peer-to-peer and ...it creates a free market for information."
For my company it means...
"I'd like [the information highway] to be a user interface onto news [and information]. We're offering Global Network Navigator to develop voices on news that people can trust... The Internet is great because it's distributed and solves distribution problems."
In the coming year...
"The World-Wide Web is the most significant product of the 1990s, and this year we'll begin to see the deployment of secure, encrypted transactions so that people will be able to buy things on the Web.
"I think the Web will be the basis for a whole new industry in much the same way that the PC software industry developed."

Scott McNealy
CEO
Sun Microsystems, Inc.
Mountain View, Calif.

The information highway is...
"...everything that allows you to communicate and complete transactions with people remotely... including the Internet, public and private networks. It's currently all patched together like a freeway system, and there's a lot of repaving going on as we try to make the dirt roads into freeways."
For my company it means...
"...a huge opportunity [for our] multimedia authoring system and security and authentication. Disney does not want *The Lion King*, for instance, sent out to 30,000 users by some hacker."
In the coming year...
"The year-to-year changes in the highway will be imperceptible, but the five-year changes will be astounding. It won't be *Beavis and Butthead* on demand driving this but corporations working with other corporations and clients and suppliers."

Steven P. Hansen
Director of information services
The Toro Co.
Minneapolis

The information highway is...
"...a network and methodology for publicly accessing available information. It's also a network connection to facilitate [on-line] information interchange with business partners that we're using fax and phone services with today."
For my company it means...
"At the moment, it's an attractive nuisance. People may surf the Internet for long periods of time without keeping the company's best interests served."
In the coming year...
"The two most common things I hear about are directories of services: what's available and how to get to it. The second issue is security. The misuse of this facility is a big concern of ours."

Robert P. Tabb
Vice president, systems development
Ryder System, Inc.
Miami

The information highway is...
"...a communications network that is accessible to all kinds of entities, including business, academic and personal."
For my company it means...
"We're building our own internal network, but we're going to interface with suppliers for purchase orders and the delivery of invoices. We're also building a knowledge base of our customers and prospects from our own databases as well as other services."
In the coming year...
"Standardization is key. The maturation of frame relay and [Asynchronous Transfer Mode] technologies is going to be absolutely key. We will have to determine how our customers will get access to it."

Craig D. Goldman
Senior vice president and CIO
The Chase Manhattan Bank NA
New York

The information highway is...
"...There really isn't just one. You have the Internet, AT&T's [forthcoming] services with Lotus' Notes, CompuServe, Prodigy. I could go on and on."
For my company it means...
"We'll deliver services to customers how they want it, not how we want it. We're [currently] working to identify opportunities for wholesale and retail activities."
In the coming year...
"The introduction of secure networks will allow us to depend upon the capacity, performance and security of transactions flowing over the information highways. The amount of quality resources being thrown at this will help speed it up."

Charles Wang
CEO
Computer Associates International, Inc.
Islandia, N.Y.

The information highway is...
"...a tool we can use to communicate among ourselves as well as with clients. It's not just a hacker's tool and has become much easier to use with the advent of Mosaic."
For my company it means...
"The speed with which you can communicate and get information is one of the biggest benefits. But you want to be better able to filter information so you don't spend all of your time looking for it. [One thing] CA will [focus on is] security systems management."
In the coming year...
"The advent of Mosaic will increase the volume of the Internet dramatically — overnight. People will begin to build business applications and tools that really use the information highway."

Peter R. Tittler
Vice president, networks and technology
Avis, Inc.
Garden City, N.Y.

The information highway is...
"...any external network connection that allows people to tap into any number of on-line services. I don't view it as one specific network. It's really universal connectivity where anyone can get to anyone."
For my company it means...
"...we can benefit by having our customers contact us directly through E-mail [instead of by fax or phone] if they're trying to rent a car or register a complaint."
In the coming year...
"We will hit critical mass in the number of people hooked up to the information highway. I want to be able to get to all of our suppliers, and just as many of our customers will want to be able to reach us."

Larry Ellison
CEO
Oracle Corp.
Redwood Shores, Calif.

The information highway is...
"By combining all information in digital form, and making it available everywhere, the information highway will utterly change our lives."
For my company it means...
"Oracle is laying the foundation for the information highway with companies such as BT, Bell Atlantic and BellSouth by providing the enabling technology to deliver interactive information services to customers."
In the coming year...
"BT has already turned on interactive services to the home and will expand to 2,500 homes in mid-1995. Approval of pending installations is dependent on regulatory approval, and we hope to see that in 1995."

Compiled by Thomas Hoffman and Melinda-Carol Ballou.

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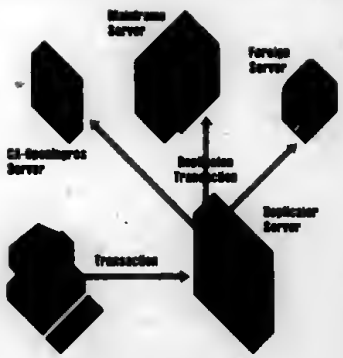

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Re-engineering IS

It's all about change in IS these days. Client/server is sweeping away old skill sets and bringing applications ever closer to users. Business pressures are forcing some IS organizations to break up and decentralize, while cost concerns are sending others in the opposite direction. In the absence of simple solutions, here are some thoughts from the thinkers and the practitioners about what makes a great IS organization these days.

Client/server technology is remaking IS groups everywhere. A few solid techniques can help keep a roof over your head while you build a new foundation.

By Joseph Maglitta

It's no secret that the glass house in many organizations has been shattering for more than a decade. Yet as the new year dawns, many large and medium-size information systems departments still face a major challenge: how to avoid getting cut to ribbons by shards from the distributed computing explosion — especially with client/server systems.

Like any major renovation, building with client/server technology invariably produces dislocation, noise, dirt and lots of cursing. The new floor plans may seem strange and confusing long after the dust has settled. And like most construction, it's expensive, and it always costs more than planned.

Unfortunately, there's no universal blueprint for constructing a safe IS structure to support client/server systems. Because of differences in budgets, history, skills and vision, one company's dream house is another's cabana. So how do you keep the roof from collapsing over your head while you learn new building techniques?

According to organizational architects and distributed systems builders, buying off-the-shelf software whenever possible is a good idea. So is knowing when existing applications should be demolished or merely redecorated using "screen scrapers" or graphical user interfaces. But for client/server to work, experts agree, IS must also swap its hard-fist mentality for an open mind and warmer handshake.

Beyond that, consultants say a handful of simple principles will provide a solid foundation for IS groups trying to reorganize around nontraditional computing models.

- **Draft your own plans.** Many client/server projects are handled by IS-led teams in business units. But experienced hands say any client/server effort, like any sound technology initiative, should reflect your company and its IS structure, not some prefabricated ideal.

Say you're a highly centralized, technologically conservative firm that values efficiency

Ferruccio Sardello

over innovation. Chances are nearly zero that you'll get very far selling management on a big, dispersed client/server program.

> **Unlike mainframe jobs, client/server applications are meant to be changed. Your chances of success will be greater if you notify business clients from the start that work crews will be permanently on site.**

Instead, says Steve Guengerich, president of the educational division at BSG Corp., a Houston-based systems integrator, shoot for a quick-hit initiative to demonstrate the return on investment of client/server. You can then expand on that success, he says.

Consultants say whatever structure you choose should allow for frequent user feedback and idea swapping among developers. Consider creating a small, centralized unit to facilitate sharing of project results, especially failures.

• Build learning into the structure. You may be solid today, but what happens when the next wave of newfangled development technology hits the market?

To avoid becoming obsolete, build just-in-time training, mentoring programs and other long-term educational tactics into your efforts, says Bert Rubenstein, president of Cambridge Technology Partners in Cambridge, Mass. "Many organizations say, 'Oh my gosh, the mainframe is dead; client/server is here,' and they're not to train everyone. They rush everyone through training and end up with a whole generation of people with mediocre skills." Gradual, phased, continual learning is better, he says.

And pay extra attention to negotiation, facilitation, user partnering and other "soft" skills. Often these skills — and not technology — will make or break client/server projects.

What if IS staffers aren't willing or able to help build a new organization? Bill Zeitz, president of New York consultancy Zeitz and Associates and former IS director at American Cyanamid Co., has a simple approach. After providing a fair chance to change, he advises: "Give them a handshake and show them the door." However, he and others say that with some client/server applications running up to a million lines of code, there will always be room for professional application developers who understand areas such as documentation and maintenance.

• Hang a work-in-progress sign. Unlike mainframe jobs, client/server applications are meant to be changed. Your chances of success will be greater if you notify business clients from the start that work crews will be permanently on site.

"Don't think about the beginning and end of the project," says Judith Hurwitz, president of Hurwitz Consulting Group, Inc. in Watertown, Mass. "You have to look at it as an interactive process." Pretend you're a software company, not an IS department, she advises. "Then you can say, 'This is Version 1.0 of the product.'"

That kind of flexibility lets IS turn on a dime as the business changes, Hurwitz explains. "Then you can be proactive and ask, 'How can we keep evolving this project?'"

Whatever your development structure, experts agree that project teams must contain the proper mix of IS staffers and businesspeople.

• Hire subcontractors. Used properly, outside systems integrators and client/server developers can help companies do a faster, better job than many do-it-yourselfers. Just make sure your contract has a no-solicitation clause that prevents vendors from hiring away your stars.

If you do hire outsiders, "be careful not to demoralize IS staffers," cautions Wick Keating, director of client/server computing at American Management Systems in Arlington, Va. Sooner or later, techies will hit the road if you don't provide them with chances to work on more glamorous projects.

Conversely, if you outsource legacy maintenance so your staff can focus on client/server, be realistic about how much time you'll save. "You can't wash your hands completely," Keating says.

• Bring extra cash. Client/server technology may trim IS spending but probably not any time soon. Experts say to expect a spike of 2% to 30% of your current technology budget. The reason: higher salaries, bigger operating and development staffs, training expenses and the need to run old and new systems simultaneously.

At American Cyanamid, a modest initial move to distributed computing added "a couple of million" dollars, or about 20%, to IS costs the first year alone, including training, software and networking, Zeitz says.

It's possible to shorten the duration of the spike by aggressive training (see story page 46). But there's no getting around it: While costs-per-function may eventually drop, actual costs probably will not. Moreover, growing user expectations and system complexity will continue to drive up costs.

In the end, savvy architects of both buildings and information systems discover there are few rules — only solid building blocks. Ultimately, company attitude, not organization charts, will probably determine if your client/server projects get built up or condemned. ◆

STROKES DIFFERENT

mmunity Mutual Insurance Co.

By Ed Scannell

Last year the IS department at Community Mutual Insurance Co in Cincinnati was under fire.

The company's nine business units and two subsidiaries were complaining about the information systems department's lack of response to their demands for in ternally developed applications aod support.

Puzzliog over the solution, the department faced the classie conundrum of whether to centralize or deceotralize its applicatioo develop ment and support functions.

"A centralized organization, if it is run well, can give you maximum effieiency through ecooomies of scale," says Bill Eager, Community Mutual's senior vice president and ehief information officer. "However, it may not be the most effective way because you can lose touch with the business priorities."

The department decided to sacrifice economies of scale in order to more effectively meet its business units' and subsidiaries' application needs. It took about 200 of its central development staff and split them up among the 10 development groups, each of whieh focused on supporting one strategie business unit.

The results have been positive on several fronts.

First, applications are being developed in a more timely manner because several development projects can now proceed simultaneously at the various units and not he logjammed in central IS. Second, the fact that the general managers of the business units have a greater sense of control and empowerment over their own development projects has helped improve the relationship between the units and IS.

General managers "now feel they have a set of systems resources they could budget for. They also feel they have a right to expect that group of folks to work specifically on their problem and not have to fight with other divisions for their time," Eager says.

Some snafus

The decentralization, however, has not been without flaws. In fixing some old problems, the IS department discovered it was creating some new nnes.

For instance, when one development team enhanced a mission-critical application used by a half-dozen nr so of the other units, those enhancements, while henfitting its customers, caused major headaches for another division's customers.

"A change made by division A would sometimes severely affect division B. The result would be that those customers [of divisian B]

Union National Bank

By Ed Scannell

'If you are acquiring in a market where you already do business, the efficiencies [of centralizing] can be as high as 35% to 40%, and maybe 15% when you go into a new market,' Judge Fowler says

First Union National Bank, which has been huying other banks during the past couple of years the way some people collect baseball cards, would have had good reason simply to decentralize its information systems operations.

But as more than a few corporate IS managers can attest, sueh an approach can prove expensive and time-consuming. Not to mention that eustomers can become frustrated when dats center proliferation delays products and reviewing credit services.

For just these reasons, First Union quickly centralized the data centers of each of the 20 banks it acquired in the past two years, making them compatible with its two permaoent data centers in Charlotte, N.C., and Jacksonville, Fla

Judge Fowler, First Union's director of systems development, has been a guiding force behind his company's decisioo to centralize the bank's IS operations.

The rapid conversioo and integration of the acquired banks' information centers differs radically from that of, say, Banc One Corp., where the IS departments of aequired banks are kept separate. In the past, Banc One has worked as a loose alliance of franehises where each group retains its own independence, although it has backed off from that philosophy somewhat and has been consolidating some of its banks back intn a centralized system during tbe past year or so. But Fowler says he helieves the advantages nf his approach will he borne out.

Centralizing IS, Fowler says, can result in a significant reduction in the number of administrative and support people, as well as those responsible for writing procedures and reviewing credit practices.

"If you are acquiring in a market where you already do business, the effieiencies [of centralizing] can be as high as 35% to 40% and maybe 15% when you go into a new market," Fowler says.

Systamwida implamantation

Another major advantage tn First Union's approach is significant savings when developing a new prodnct, the same version of which can he rolled ont to all the acquired banks. In a more decentralized system, that same product might have to be adapted several times to custom-fit each bank's IS department.

"If you are rolling out a new deposit produet but you have 20 different deposit systems to deal with and you also choose to make it an enterprisewide [prodnct], you have to physically

would get a notice that was irrelevant, or maybe a claim was calculated incorrectly," Eager explains. "And division A would carry on not knowing what havoc they caused."

In response, Eager and his IS team had to recentralize the one or two application development functions that served most of the company. "We reeled some of that back in and recentralized support for some of those core systems where we have multiple divisions using them," Eager said.

User rapport is key

What has made managing the decentralization process easier was Eager's decision to immediately establish a relationship with each of the business units when he came on board a year ago. Being Community Mutual's third CIO in just four years, Eager believed clear communication with his peers had to be established if the IS reorganization was going to work.

"This is an organization that had held its [information technology] group in such low regard that it lost its clout with the rest of the company. Consequently, the previous CIOs were getting churned up among the various user groups," Eager says. "So I have taken the time to explain what I am doing, why I am doing it and why it is important to be done."

Eager says he has made a career out of fighting fires — going into troubled IS organizations, identifying and solving their problems and then moving on to a new challenge every few years.

"I do turnaround. I go into an organization for five or six years, fix the problems, get bored, and when the recruiter calls, I go off and do it again. [Community Mutual] is the third time I have done this," Eager says.

Even with open lines of communication, one of the most difficult challenges is getting multiple divisions to work on a joint project where each is responsible for a specific contribution.

The central IS team still has to referee squabbles where one unit's preference for programming tools or a particular development approach conflicts with another's. Eager says he curbs such bickering by keeping a tight rein over product standards as well as a strict review and approval process. "It is almost like the prime minister in England, where you have to pull together a coalition of five different parties and hold it together long enough to complete the task," he remarks.

Eager acknowledges that Community Mutual has not saved any money by decentralizing development. That does not mean, however, that upper management does not want to see some productivity return on its $50 million IS budget investment.

"I think [decentralizing application development] has more to do with devoting resources to different sections of the business and giving them a sense of having more control so they can move ahead," Eager says.

In what Eager describes as a "merger of true equals," Community Mutual last month signed an agreement to merge with The Associated Group, the Blue Cross/Blue Shield licensee for Indiana and Kentucky.

The Associated Group currently maintains separate IS centers for Indiana and Kentucky, and both groups appear to have taken a decentralized approach to their respective business units. But because the merger is not expected to be completed for another nine months, Eager adds that it is too early to tell if each IS center will continue to operate autonomously.

The decision of both companies to distribute IS operations was not a major factor in their merging. "I haven't gotten inside our CEO's head to see how seriously they have considered the [information technology] side of things. But I believe the market synergy and the opportunity to put together an integrated health care [system] on a broad regional basis is the primary motivator," Eager says. ◆

build and test it 20 times and offer customized documentation 20 times," Fowler says.

Fully understanding Fowler's strategy, however, hinges on understanding standards. One major advantage to being committed to standards is not having to swap in and out thousands of copies of a desktop operating system or server every other year as one competitor's products supersede another's.

"Once you have a standard where 80% to 90% of something is entrenched, you are better off staying with it because of the way companies like IBM or Microsoft will continue to leapfrog each other with technology," says the 27-year IS veteran.

Besides avoiding the torture of swapping competing hardware and software products in and out, standards have also made it easier for First Union to negotiate longer-term contracts with vendors. That serves to reduce internal development and user training costs while speeding product and service rollouts across all the acquired banks.

One new project expected to be rolled out early next year will allow loan officers to go into the field to begin the loan processing process on their portables. They will be able to send various documents back to the home office, where they will be automatically routed to workers who complete several different functions as part of processing the application.

"We had to put together a blueprint for the infrastructure for the delivery of systems and products to customers," says Jeff Scott, assistant director of enterprise architectures at First Union. "We believe that once you have the infrastructure in place, you can build products on top of it as you identify various application needs."

Currently, that infrastructure consists of five Amdahl Corp. 3090-class mainframes, which run the two data centers. Those systems run IBM's DB2 and IMS databases as well as IBM's CICS transaction monitor. The bank also has about 150 NetWare 3.x servers from Novell, Inc., all running on uniprocessor 486-based servers mostly from Compaq Computer Corp.

Big iron retention

Centralizing so many information centers has meant a continued reliance on the company's five mainframes, something Fowler and his team see continuing for the rest of this decade.

Although mainframes are decidedly unhip these days, they have proved invaluable as the bank has smoothly brought on board so many information systems spread out over eight southern and mid-Atlantic states.

"I am not particularly interested in getting rid of mainframe applications like IMS with something like 20 million lines of mainframe code to support," Fowler says. "Besides, I have never lost a minute of sleep with MVS. In 27 years, I have had only one problem that took more than 12 hours to fix."

Besides providing a certain peace of mind, mainframes also provide greater security and control over the banks' data. Fowler says none of the distributed strategies his team evaluated compared favorably to the sort of security that mainframes provide. "All customer data is in the mainframe and secured there. We don't even allow the replication of data out of the mainframe to distributed sites," Fowler says.

But while First Union will continue to depend on mainframes, it is not blind to the opportunities client/server can provide. With about 36,000 employees and a little more than 15,000 PCs spread among its sites, First Union has rolled out more than a dozen client/server-based products and services.

"We can see the technology wave coming, and we are getting ready so users can surf it," Scott says. First Union anchored the bottom end of its client/server strategy on IBM's OS/2 on the desktop, fighting off periodic temptations to switch to Windows. ◆

OUT OF THE BUNKER

Lean budgets and mounting workloads are prompting a new partnership between IS departments and former outsourcing foes

By Craig Stedman

Vendors of outsourcing services and information systems departments may never be the best of friends. But the complex and costly transition to client/server environments is pushing IS to drop its defenses, come out of the bunker and seek some help from the once-dreaded barbarians at the gate.

With technology changing at warp speed, outsourcing is not just for the chief financial officer anymore. It also does not necessarily mean turning the lights out on IS. Selective outsourcing of some — but not all — IS functions has become a socially acceptable way of keeping up with technology while retaining control over much of the operation.

"I just see these people as an extension of my own department," says Mike Applegate, network services manager at FoxMeyer Health Corp., a $5.5 billion pharmaceutical distributor in Dallas that recently outsourced its LAN operations and PC help desk to Hewlett-Packard Co.

To be sure, the promised land of reduced costs remains a strong selling point even for selective outsourcing in an era of corporate downsizing. But in a survey last year by Dataquest, Inc. in San Jose, Calif., the need for outside expertise topped the list of reasons why outsourcing customers look beyond their own data center walls.

"Cycle time is very important, and hiring and training [staff] people is the antithesis of a fast cycle time," says Robert Brown, senior vice president and chief information officer at FoxMeyer.

FoxMeyer hopes to make a complete escape from its IBM and Unisys Corp. mainframes just 18 months after it began a client/server systems development project early last year. The project had an accelerated schedule that would not have been feasible without the outsourcing arrangements, Brown says.

"We've saved a little bit of money, but more importantly, our ability to respond [to technology or business changes] has increased," says another IS executive whose company has outsourced pieces of its IS operation to two vendors. "We can scale up and scale down more quickly than before," added the executive, who asked not to be identified.

Bob Burgdorf

FoxMeyer's Robert Brown (top) and Mike Applegate say outsourcing has reduced cycle time

Selective outsourcing "allows you to rid yourself of some things that are time consuming and take you away from what your real job is," says Linda Mainord, president of the IBM-oriented Guide International Corp. user group and manager of application services for the Memphis city schools.

The Memphis schools have been outsourcing PC installation and configuration for the past year after realizing that there were not enough internal IS staffers to go around, Mainord says. Network support is another task "I would love to have someone take off my hands," she adds.

Some vendors, most notably HP, are building their strategies around selective outsourcing. Dataquest projects that both network and desktop outsourcing will grow at faster rates than data center deals. "The things that are most visible are the big mega-outsourcing deals, but there's an increasing need for more of a task-oriented outsourcing," says Allie Young, a professional services analyst at Dataquest's Framingham, Mass., office.

Meta Group, Inc., a consultancy in Stamford, Conn., has been beating the selective outsourcing drum since 1991 and got "a lot better reception [from IS departments] this past year than we did in the previous two years," noted Chris Byrnes, program director for services and systems management strategies.

"The leading-edge accounts with client/server applications have learned their lessons," Byrnes says. Wholesale outsourcing "is not appropriate for most companies" because of the strategic importance of IS, he added. On the other hand, few IS organizations have sufficient staff to support the staggering growth of PCs and desktop applications.

FoxMeyer has no intention of ceding control over the parts of IS that it considers "strategic or proprietary," Brown adds. The company is retaining all application development plus ownership of data, security systems and its mainframe data center, he says. ◆

IS ARCHITECTS FOR HIRE

ANDERSEN CONSULTING
1345 Avenue of the Americas
New York, N.Y. 10105
(212) 708-8309

Service director: Bill Stoddard
1993 re-engineering revenue: $350 million
Re-engineering revenue as percent of total service revenue: 12%
Industry strengths: Strong in most industries
Key clients: Conrail, AT&T, Sanofi Winthrop Pharmaceuticals, Commonwealth Edison
Number of re-engineering consultants: 3,000+

Andersen's "Value-Driven" methodology works to transform IS from being reactive to proactive through its five core competencies: formulating business and operational strategies, redesigning business processes, managing change, architecting information technology and managing complexity.

CSC CONSULTING GROUP
5 Cambridge Center
Cambridge, Mass. 02142
(617) 492-1500

Service director: Jerry Loev
1993 re-engineering revenue: $130 million
Re-engineering revenue as percent of total service revenue: 11%
Industry strengths: Aerospace, distribution, government, manufacturing, retail, telecommunications, transportation, utilities
Key clients: Amoco, Bell Atlantic, Hallmark
Number of re-engineering consultants: 250

CSC Impact, the IS re-engineering arm of CSC Consulting, uses the following techniques to help IS departments devise and align their strategies with those of the overall business: create information technology architectures to assist companies in their technology acquisitions and deployments, improve systems development processes so applications are built on time and on budget and educate business executives on the business implications of emerging technologies.

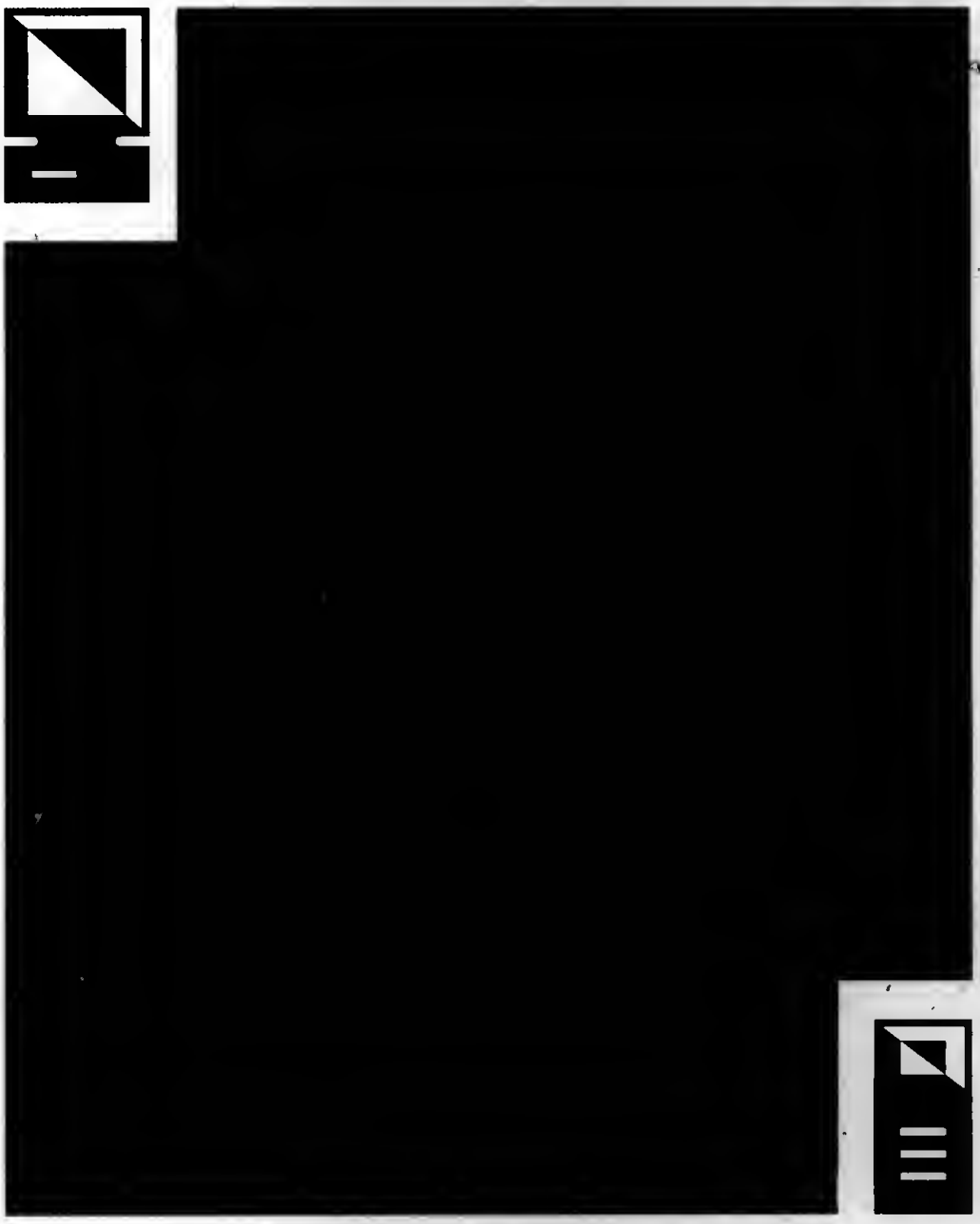
GEMINI CONSULTING
25 Airport Road
Morristown, N.J. 07960
(201) 285-9000

Service director: Mitchell Schrudder
1993 re-engineering revenue: $90 million
Re-engineering revenue as percent of total service revenue: 4%
Industry strengths: Oil, gas, chemicals, pharmaceuticals, process manufacturing, telecommunications, consumer durable goods
Key clients: Rolls Royce Motor Cars, Union Carbide, MasterCard, most major regional Bell holding companies
Number of re-engineering consultants: 1,300

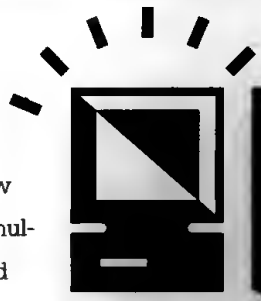
Gemini's "Construct" methodology is a unified model that includes business, organization and information technology and accepts that changes in one are immediately reflected in the others. There are five key services of the information management group: the information management strategy group works to align IS strategies with business goals; the effectiveness group analyzes the efficiency of the IS organization; rapid application prototyping and design practices develop working prototypes before decisions have to be made; and delivery integration provides systems integrator skills.

• Revenue figures supplied by Gartner Group, Inc. Compiled by senior researcher Kevin Burden.

WHY IS INTEGRATING YOUR PCs SUCH A PROBLEM?



WE HAVE



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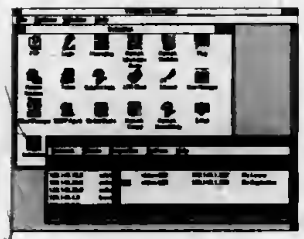

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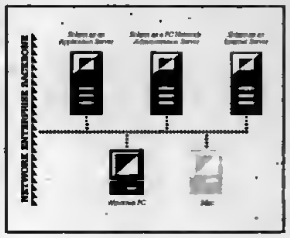

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PCIAD

'Reskilling' the WORKFORCE

IS managers find there's no road map for training in the distributed '90s

By Julia King

Ask a dozen information systems managers to identify the thorniest issue associated with re-engineering, and chances are good you'll receive a single answer: training.

Ask the same dozen managers how they're going about training their IS staffs in newer client/server and object-oriented technologies, and you'll inevitably hear 12 different replies. There is no single, proven approach to retraining in this wild new world.

There are two things, however, on which most managers seem to agree:

No. 1: Retraining IS staffers in distributed computing technologies is the only guaranteed way to find people with the skills you need.

"That's because even if you lay everyone off, you're not going to find enough replacement bodies [on the open market] with the right skill sets," says Mark Gregoire, manager of American Management Systems, Inc.'s training services unit in Manchester, Conn.

No. 2: Contrary to a widely held myth that it's difficult, if not impossible, for mainframe developers to make the transition to new technologies, half or more of those who receive the proper training can and do make the jump from highly centralized, host-based computing to decentralized, event-driven computing environments. So says Gene Raphaelian, vice president of industry service at Gartner Group, Inc.'s Santa Clara, Calif., office.

"It's very traumatic for people, and it's a totally different way of doing something. But of the people we have trained so far, not one [mainframe developer] has not been able to make the transition," says an IS director in charge of management production systems at a large national retailer.

Like many other IS managers interviewed for this story, he did not want his firm named for fear of raids on his staff.

"It's pretty brutal out there," he says, referring to the limited supply of IS personnel skilled in client/server and object-oriented technologies in particular. "If people know you have a staff trained in client/server, they'll come after them."

But few companies are training entire IS staffs. Instead, just-in-time training, conducted on the job and on a project-by-project basis, is emerging as the preferred delivery method.

"If you provide training too far in advance of a project, [developers] will never keep that mind-set into the project," explains a senior vice president of IS at a large insurance and financial services firm.

Also, training IS developers in hot new technologies and then failing to provide an immediate opportunity to apply them turns people off, he says. "What happens is you've got them all dressed up with no place to go," he says.

At the opposite end of the spectrum, however, are firms such as Morgan, Lewis and Bockius, a national law practice that is gradually exposing mainframe developers to client/server and other new technologies, with an eye toward eventually reskilling all of the developers.

"We're not doing a baptism by fire," says Donald O. Sternfeld, the firm's Philadelphia-based director of IS. The primary reason is that the firm plans a relatively gradual migration to client/server technologies. But when it does make the transition, it wants IS professionals who know the firm's business, and these are the same people on board now.

> "We have a tremendous investment in our current staff. They know how the business runs. That won't change; just the tools are going to change."
> — Donald O. Sternfeld, Morgan, Lewis and Bockius

"We have a tremendous investment in the current staff. They know how the business runs. That won't change; just the tools are going to change," Sternfeld says.

Teaching, training

Precisely what to teach is another issue, and here, too, IS managers have taken a variety of approaches.

Carolina Power & Light Co. has created a separate systems integration organization that receives highly technical training in communications protocols, application programming interfaces, networking and architectural standards.

Application developers, on the other hand, are skilled specifically in development languages such as Microsoft Corp.'s Visual Basic. The two groups work side by side on client/server projects, says Jay Brown, manager of information technology and standards at the utility.

Other companies have opted to train developers on specific tools, such as the C, C++ and Smalltalk programming languages, rather than provide a broader-based orientation to client/server concepts.

"The advantage of limiting training to specific tools is that it keeps people focused," according to an IS manager who requested anonymity.

Sprint Corp., meanwhile, is covering both bases under a two-tiered training program in which 300 to 400 IS staffers have participated in the past two years, says Mick Hartzell, an educational consultant at the company's University of Excellence in Kansas City, Kan.

At the first tier, they are trained in an internal systems development methodology that is applicable to all client/server projects, Hartzell says.

After that, they are trained on specific tools that will be used on individual projects.

As for the potential of staffing raids, Hartzell says Sprint has "no fear."

"The company is well aware that competition is stiff out there and that people are going to be attracted by other offers. But we really believe we offer employees more than there is on the outside," he says. ✦

NO WAY OUT

Don't cut yourself off at the knees when it comes to training: You'll pay one way or another

By Julia King

Training information systems professionals in client/server and object-oriented technologies is expensive, but having them train on their own costs even more. So says Gartner Group, Inc., which figures that companies with formal training programs spend from $200 to $2,000 per day per IS employee retrained. By contrast, firms that leave it up to staffers to learn on their own end up paying about five times as much, largely due to lost productivity.

"Formal training is absolutely cheaper than on-the-job training," says Gene Raphaelian, Gartner's vice president of industry services. "It also significantly lowers the risk (of failure) on the [client/server] project at hand."

These are among the findings Raphaelian includes in a study titled "Changing IS Organizations: The Effect of Client/Server Implementations on Job Skills Requirements." The study, commissioned in 1993 by the New York-based Open Users Recommended Solutions Group, found "most organizations' training methods are a hodgepodge of on-the-job training, self-training and application-specific training."

What's stopping companies from instituting more formal training programs for client/server environments?

The No. 1 reason is cost or perceived cost, says Mark Gregoire, manager of American Management Systems's training services unit.

"Sticker shock has created a certain amount of paralysis and has definitely stopped organizations from moving as promptly on training as they should," Gregoire says.

Still, for all of the talk about how high costs are, users and vendors both seem to agree that no one knows exactly how much – in dollars and cents – companies actually are paying to "reskill" IS professionals. What clouds the issue is that costs are so widely dispersed, notes Mick Hartzell, an educational consultant at Sprint's University of Excellence.

"When you translate your effort out to the cost side, it gets into time away from the job at hand, the cost of trainers' salaries, the cost of training support people and the capital investment necessary to put the [client/server] environment in place so people can practice," Hartzell says.

"Because the training environment has to replicate the work environment, to give people an opportunity to practice on the same systems they'll find in the workplace, you start to see a hefty investment of capital dollars."

The bottom line: "When someone says training costs a lot, they're not exaggerating," Hartzell says.

Sticker Shock

Forrester Research, Inc. estimates out-of-pocket costs for effectively retraining developers in client/server skills will approach $1.8 million for an IS organization with 200 developers over the course of the training. The firm estimates that maintaining the new skills will cost about $730,000 annually.

Get Focused

By Allan E. Alter

The cycles with the most impact on IS aren't machine cycles or product cycles. They're business cycles.

And overall, the economic indicators show that the economy has moved over to the upside of the cycle.

Corporate profits rose 39% in the third quarter of 1994, while the unemployment rate dropped to 5.8% in October and the manufacturing capacity rate surged to 85%. Even the Federal Reserve's recent interest rate hikes are a backhanded indicator of the economy's strength. The Fed is worried rapid growth could cause inflation.

If economic history is any guide, companies will not focus primarily on squeezing out costs and improving productivity — the only way to increase profits in declining or sluggish markets. CEOs will want new ways to exploit growing markets and create new ones.

And that modifies the IS agenda.

• The IS world will have to broaden its scope from cost-cutting, outsourcing and re-engineering. Pressures will build for IS leaders to grasp strategies, markets and customers well enough to think up imaginative ways to win new customers and keep old customers loyal.

Bill Russell

Take just one industry, agribusiness: Recently, Monsanto provided farmers with Apple Newton personal digital assistants to help them track their use of chemicals and fertilizers. Deere & Co. is piloting tractors that can communicate with global positioning satellites to aid "precision farming." IS departments must focus more on building those kinds of customer-winning, market-building applications.

• IS leaders will need to stay on top of new technologies to help their companies be market leaders and drivers. All those mid-'90s trends known as agile competition, mass customization, time-based competition, electronic commerce, on-line multimedia marketing and delighting the customer are enabled through ingenious combinations of new and old technologies.

• IS management must continue to lower costs. If you think the time is finally right to ask for that big IS budget increase, think again. Unlike the last expansion in the early '80s, CEOs won't let up the pressure to cut costs during this economic upturn. U.S. manufacturers don't want to give up the ground they've regained from Japanese and other Asian competitors. Re-engineering, total quality management and activity-based costing have shown managers new ways to eliminate hidden costs embedded in business and management processes. CIOs, like the heads of every other function, must continue to cut their expenses.

• IS executives must manage through triage... The IS agenda has become more ambitious, not less. The first rule for overburdened managers is to delegate responsibility. IS executives will have to decide which IS functions require close daily attention, which can be safely outsourced to other firms and which can be outsourced in the future. IS executives must invest their time and resources in information technology-enabled business initiatives that require hands-on attention and innovative thinking.

... and lead through more effective partnering. IS managers must make sure vendors and their service providers act like effective partners, holding them to the same high standards a Ford or Toyota would ask from their suppliers. Meanwhile, CIOs must find better ways to work with non-IS management. CIOs still complain that they are left out of business decisions; business management still says IS doesn't understand their concerns well enough. The two sides must negotiate some far-reaching, mutually satisfactory guidelines to govern how to make technology and information management decisions.

The recovery may have widened the IS agenda, but the agenda itself couldn't be more clear. ✦

Alter is a *Computerworld* senior editor, management. He can be reached via the Internet at aalter@cw.com.

Personality PARADE

EXECS TO WATCH

Joseph R. Cleveland
Vice president and general manager of IS
Martin Marietta, Orlando, Fla.

Joe Cleveland is in the middle of one of the biggest mergers in the defense/aerospace industry. The GE veteran will spend 1995 managing the merger of Martin Marietta and Lockheed Corp. in Calabasas, Calif., should it win approval. Presiding over Martin Marietta's Internal Information Systems (MMIIS), Cleveland spent 1994 integrating the IS organizations at Martin Marietta and GE Aerospace.

Cleveland also helped the company save $70 million in 1994 by consolidating mainframes at MMIIS headquarters in Orlando, negotiating new telecommunications, software and maintenance contracts and implementing common back-office systems.

The company looks to Cleveland and MMIIS to showcase its IS prowess to its systems integration and outsourcing customers.

– Allan E. Alter

William F. Powers
Executive director of IS
Ford Motor Co., Dearborn, Mich.

Much of the responsibility for taking Ford global in 1995 rests with Bill Powers, who moved into his current position in August.

For years, Ford operated as a confederation of regional car companies sharing little more than the Ford moniker. Then the company decided to build "world cars" that could be sold in any market. But after spending $6 billion to develop the Ford Contour/Mercury Mystique, executives at the Dearborn plant realized they needed to reorganize Ford as a single, truly global company. As a result, on Jan. 1, Ford North America and Ford of Europe begin operating as a single entity.

For the globalization effort to succeed, Powers must ensure that IS develops systems that can share information and integrate business processes on a worldwide basis yet still respond to local conditions.

– Allan E. Alter

Cinda Hallman
Vice president of IS, CIO
Du Pont Co., Wilmington, Del.

Spend a few minutes listening to Cinda Hallman and you begin to believe Du Pont is one giant that just might learn to dance. Dazed by heavy losses in the early 1990s, the megamanufacturer set out to cut annual costs by $1 billion and transform its 600 businesses into a sleek, smartly automated multinational company.

Hallman is a no-nonsense IS careerist who came to Du Pont in 1988 from Conoco, Inc. in Houston. In the past few years she has emerged as an unexpected downsizing hero. By decentralizing 1,200 IS staffers, eliminating 1,000 contractors and shrinking 200 data centers to 40, Hallman slashed Du Pont's IS budget from $1.2 billion to about $700 million. Now, Hallman and the remaining 4,800 IS staffers are focusing on technology that will better link the tens of thousands of Du Pont suppliers and customers. Pilot projects aimed at linking outside production scheduling, order placement, inventory and other systems will rush ahead in 1995.

– Joseph Maglitta

Steve Heckler
CIO
Health Net, Inc., Woodland Hills, Calif.

In Steve Heckler's care is information technology for the nation's fourth-largest health maintenance organization, a $2 billion company with more than 1 million subscribers and a $40 million annual information technology budget. One of Heckler's main challenges in 1995 will be transforming the company into a paperless enterprise by implementing a companywide imaging project.

Also a priority is expanding the California Health Care Information Network to include more than 1,500 physicians and other providers, hospitals and payers. The network, a joint venture of Health Net, Blue Cross of California, Blue Shield of California and Prucare, Inc., is an example of "coopetition," a trend under which competing companies in the same industry share resources to reduce administrative costs and provide customers with a common network interface.

– Julie King

Client/Server's New Order

Status quo no more. Borders once thought untouchable have been breaking down now for several years in the client/server world. And still the landscape changes dramatically from one year to the next. Last year's duds may have finally delivered true client/server solutions – even elegant ones – while those powerhouse tools with all the extras just never really worked like the thing you had before. Keeping track of it all is your job. Making it less painful is ours.

Betting BIG on Johnny-Come-Latelies

Picking tools and technologies from industry veterans used to be safe. Today it's the small newcomers that rule the roost.

By Rosemary Cafasso

When Cummins Engine Co. went shopping for client/server distribution software last year, it selected a package from Avalon Software, Inc., a Tucson, Ariz., company with 215 employees and about as many customers.

John Brown, a director of Cummins' information systems group, says that not so long ago the more obvious choice would have been a much bigger and more well-known software company. But Avalon seemed to offer better technology as well as other benefits — such as a more personal touch he thought was necessary for a client/server implementation.

> Some of the big companies are so impersonal. You get an 800 number, and that's it. What we wanted was to partner with them so that ultimately, we get what we really wanted out of the system.
>
> —Sheila Osler, Sun Life of Canada

Nonetheless, Brown remembers that IS and other Cummins managers went through a rigorous process to show top management that Avalon was a sound choice and a viable company. With those concerns satisfied, the Cummins team believed Avalon provided the best deal they could find.

"Part of the reason was the people running Avalon," Brown says. "They stick to their word a little better than some of the bigger companies. . . . It seems like the older companies don't get out front there on the technology. Part of the reason was also that they could state a clear direction."

When it comes to client/server decisions these days, Brown's approach is increasingly common.

A noticeable difference

Yesterday's guidelines for selecting a software provider — which typically said big companies were the safe choice — often do not work for client/server. Many IS managers say it isn't that the big companies are doing a bad job of delivering client/server technology — it's just that the little ones often do it better.

"It's the smaller ones that come out of nowhere that will have a new look on things," said Kevin Reilly, vice president of information systems at Richardson Electronics Ltd. in LaFox, Ill.

Reilly, who just began the hunt for client/server financial software, says he is not sure if he will opt for a small software provider, but "there are advantages. You aren't just a number to them."

While dozens of users are still signing up with the so-called safe choices for client/server applications, such as SAP America, Inc., dozens more are selecting tiny companies with handfuls of customers and total revenue that is but a fraction of some IS budgets.

"We're looking for companies that exceed the average in terms of technology," says Connie DeLetis, vice president of IS at National Semiconductor Corp. in Santa Clara, Calif., which is piloting client/server data query software from Business Objects, Inc. in Cupertino, Calif.

"Business Objects is above average," DeLetis adds, for what he says is superior end-user functionality and a highly intuitive environment. He compared its software with end-user query tools from companies such as SAS Institute, Inc. and Information Builders, Inc., which he says target more advanced users and do not have the same level of user-friendliness.

"The risk is that it is a small company, [but] we think the risk may be well worth it," he says.

Interviews with many IS managers who decided on a smaller vendor revealed the following reasons that small is in vogue in the client/server world:

- Small companies are often the only choice on the market for new technology because the bigger companies haven't yet developed products in that area.
- In the long term, smaller companies can more quickly keep up with technology changes than some of the large ones.
- Smaller companies are more likely to establish close, first-name relationships with customers and provide a higher level of service. As a result, customers get the feeling they can more directly impact the technical direction of a product.

Times have changed

In addition, IS executives say one needs to only look at powerhouses such as IBM or Digital Equipment Corp. to realize that large companies are no longer the safest bets.

"There are risks in dealing with big companies as well," adds John Mann, a senior analyst at The Yankee Group in Boston. "They have the vagaries of politics. It's not that the company will fail, but you could end up with a product that became a hum solution."

Some IS executives remember well the old

LESSER-KNOWN SOFTWARE STARS

By Kim S. Nash

Helping to fuel the industry's charge into client/server territory is a group of small aggressive software providers that are not household names. Here's a sampling of who they are and what keys they are using to open the doors to corporate America.

adage that no one ever got fired for choosing IBM. "But the guy who said that got fired," says Robert Chin, chief information officer at HealthSource, Inc. in Hookset, N.H.

Chin, who selected Red Brick Systems, Inc. as his provider of a client/server data warehousing platform, says he believes there was more of a "fright mentality" years ago that helped promote the idea that the biggest companies were the best choices. Now the trick is to rely on oneself to make the right choices.

"The customer has to make sure they can touch the product, measure it, verify it to their own satisfaction. That's the only security blanket," Chin says.

But Chin and other IS managers are also quick to acknowledge that the risk factors can certainly be higher with tiny software providers. Not all start-ups survive, and the really hot ones are often acquired. Users say the trick is to work as many protective measures into the contract as possible.

Mission-critical safety

Some users say they are willing to select small companies for important applications but not the most essential, bet-the-business type of applications.

DeLetis, for example, is working with Business Objects for a client/server end-user data query application but says National Semiconductor is going with SAP for its core client/server applications, including manufacturing, financials and human resources.

And most users insist that source code be placed in an escrow account as part of their contract so they can get to it if the software provider goes out of business.

But users also say the rewards from working with smaller companies can help offset any risks.

Kevin McCarthy, a systems consultant at the investment management division of Cigna Corp. in Philadelphia, recently selected a client/server multidimensional database system from Dimensional Insight, Inc. in Burlington, Mass. The vendor is projecting 1994 revenue of between $2 million and $2.5 million. McCarthy cited the technology and a good working relationship as key reasons for Cigna's selection.

"The overriding reason is they had the tool we needed," McCarthy says. "We didn't go out and look for a small company."

In addition, McCarthy says his staff works well with the Dimensional Insight staff. "At the user group last year, they took a vote from the audience about what to put in the next release," he adds. "We found we do have influence on where they are going."

Sheila Osier, director of information technology at Sun Life of Canada's U.S. headquarters in Wellesley, Mass., is overseeing installation of a general ledger module from The Dodge Group in Waltham, Mass. The Dodge Group has about a half-dozen customer companies worldwide.

Johnny-come-latelies, *page 52*

Haas

Crowe

Liataud

Business Objects, Inc.
Menlo Park, Calif.
Founded: 1990
CEO: Bernard Liataud
Fiscal 1994 sales: $27.8 million, estimated
Key product: BusinessObjects
Comments: BusinessObjects is a combination graphical/English-language end-user query tool that can access relational databases such as those from Oracle Corp., Informix Software, Inc. and IBM. New features include the ability to generate more sophisticated reports and graphs using information the product has pulled off databases. Support for Oracle's Rdb, IBM's DB2 and Computer Associates International, Inc.'s Ingres databases is expected in 1995.

BusinessObjects' primary competitor is Cognos Corp., with its Impromptu query utility. Yet until Cognos moves Impromptu to platforms other than Windows, BusinessObjects — with its Macintosh and Unix Motif versions — is likely to win more users' hearts.

AT&T Corp. resells BusinessObjects, and Prism Solutions, Inc., Red Brick Systems, Inc. and others jointly market the product.

Edify Corp.
Santa Clara, Calif.
Founded: 1992
President: Jeff Crowe
Fiscal 1994 sales: $12.5 million, estimated
Key product: Electronic Workforce
Comments: Electronic Workforce has been called a real-life example of the information superhighway at work. The product is a software-agent-based technology designed to let users automate voice response, fax, phone or workflow tasks in routine administrative departments such as order processing, human resources or account inquiries.

For example, Signet Bank, a 250-branch bank serving Washington, Maryland and Virginia, recently automated a hot line for employees' charity donations to the United Way. Workers can punch in contribution amounts over the phone and that amount is automatically deducted from payroll. The updated pledge statistics are then automatically faxed to United Way offices.

Nike Corp. uses Edify products to automate network backup and for pager notification. Other customers include Apple Computer, Inc., Chevron USA, Ford Motor Co. and BayBank Systems, Inc. Electronic Workforce has won the Best of Show award at the annual GroupWare conference for two years running.

IntelliCorp, Inc.
Mountain View, Calif.
Founded: 1980
President: Ken Haas
Fiscal 1994 sales: $12 million
Key products: Object Management Workbench, Kappa
Comments: IntelliCorp's Object Management Workbench (OMW), unveiled in March, is what many observers term a complete client/server development environment with object-oriented products from design to generation to maintenance. OMW uses a full life cycle approach to visual development and runs on Unix workstations from Sun Microsystems, Inc. and Hewlett-Packard Co. as well as Windows PCs.

Informix owns 15% of the company, which it bought for approximately $1.4 million. IntelliCorp, in turn, bought $482,000 worth of products from Informix in fiscal 1994. Further, the window painter piece of Informix's new graphical development tool, New Era, was cobuilt by IntelliCorp, using Kappa. SAP of Germany has worked with IntelliCorp to integrate OMW and Kappa with SAP's R/3 line of client/server financial applications. IntelliCorp's board of directors includes bigwigs from Apple and Lotus Development Corp.

Challenging IntelliCorp, however, is the fact that object programming is far from mainstream. Early adopters such as GTE Corp. and US West Communications, Inc. account for the bulk of IntelliCorp's still-fledgling business.

Legato Systems, Inc.
Palo Alto, Calif.
Founded: 1988
CEO: Louis C. Cole
Fiscal 1994 sales: $16 million, estimated
Key products: NetWorker SingleServer, Staccato
Comments: Client/server systems management can stymie even the most sophisticated IS shops, which in turn leaves a large and growing market hole for companies such as Legato and OpenVision Technologies (see next page).

Cole

Legato started out making management aids for mainframes but quickly teamed up with key OEMs and Unix players, such as IBM, Sun, Storage Technology Corp. and Oracle, to address the pains of coordinating information storage across networks.

NetWorker SingleServer was designed to provide backup and recovery for Unix and Novell, Inc. NetWare servers. Staccato does the same but offers greater automation of the process. The company plans to get into data archiving and database protection starting in 1995.

Neuron Data, Inc.
Palo Alto, Calif.
Founded: 1985
CEO: Patrick F. Perez
Fiscal 1994 sales: $27 million, estimated

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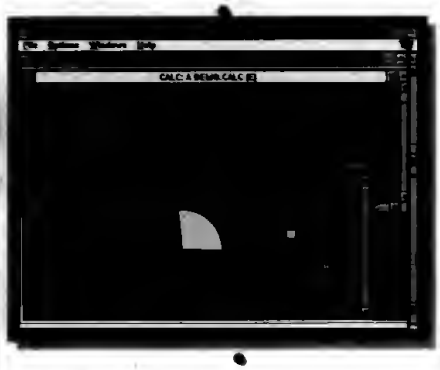

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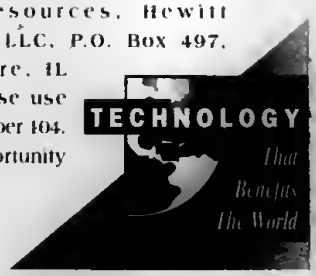

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Johnny-come-latelies

CONTINUED FROM PAGE 49

"This is more like a partnership," Osler said of the company's relationship with The Dodge Group. "You get the treatment you expect. Some of the big companies are so impersonal. You get an 800 number, and that's it. What we wanted was to partner with them so that ultimately we get what we really wanted out of the system."

Mike O'Dea, supervisor of financial systems and Unix administration in the corporate division of Ameritech, Inc. in Chicago, recently picked client/server financial software from Atlanta-based SQL Financials, Inc., a 3-year-old company whose customer base grew from 20 to 50 in 1994. He says when he needed to buy a client/server application, "no other companies were really doing it."

He has found that SQL Financials is more focused on keeping customers happy. "You become a partner, and they are more focused on trying to keep you happy," O'Dea adds. "They seem to be more flexible [than larger vendors]. They are fairly responsive and keep in step."✦

Robert Chin, CIO at HealthSource in Hookset, N.H., says that in today's world the customer must verify the product to his own satisfaction. 'That's the only security blanket,' he says.

Perez

Key products: Nexpert Object, C/S Elements
Comments: Neuron Data's Nexpert Object is an object-oriented development tool that lets users track and reuse business rules as they build applications. C/S Elements is a graphical scripting language for accessing various data storage devices. In fact, critical to the company's success so far has been its support for both object and relational databases. Large customers include Chevron Canada Resources, which bought Neuron products to help move applications off an IBM mainframe to Sun's Unix servers and workstations running Oracle.

OpenVision Technologies, Inc.
Pleasanton, Calif.
Founded: 1992
CEO: Michael S. Fields
Fiscal 1994 sales: $20 million
Key product: OpenVision Object Environment
Comments: In the 2½ years since its founding, OpenVision has acquired 14 companies, divisions, products and product licensing rights in the client/server systems management arena. Put simply, OpenVision is aggressive.

The company was founded and is managed by several former executives from Oracle, CA, Silicon Graphics, Inc. and other heavy hitters. Unlike Legato, which addresses many of the same client/server problems, OpenVision sells directly to end-user companies. Major customers include American Airlines, Wells Fargo Bank and NASA.

Fields

OpenVision's products can be mixed and matched as needed, so users are not boxed into buying more management utilities than they need. A key challenge for the firm, however, will be to enhance the communication methods it uses between its client and server components. Moreover, the products currently talk to one another via remote procedure calls, but some observers note that techniques such as replication or message-based communication are more efficient and less complex.

Schopbach

Sherpa Corp.
San Jose, Calif.
Founded: 1984
CEO: Steve Schopbach
Fiscal 1994 sales: $30 million, estimated
Key product: Sherpa
Comments: Sherpa's product data management software was designed to help companies integrate their design, engineering and manufacturing departments. Industrial manufacturers are the company's target users. For example, Hughes Aircraft Co. bought $15 million worth of Sherpa products in early 1994 as part of a global re-engineering project aimed at streamlining airplane-making operations. Hughes plans to replace the bulk of its manual and paper processes for both engineers and managers by 1997.

Overall, client/server manufacturing software is a hotter-than-hot market, and Sherpa is not alone in reaping rewards. Avalon Software, Inc. in Tucson, Ariz., and Datalogix International, Inc. in Valhalla, N.Y., are also burning up the charts with their discrete and/or process manufacturing modules. Datalogix's GEMMS package, aimed at process manufacturers such as chemical or food makers, was licensed by Oracle in September to be integrated with Oracle's own discrete manufacturing applications. Oracle also bought a 15% equity stake in $25 million Datalogix.

Tivoli Systems, Inc.
Austin, Texas
Founded: 1989
CEO: Frank Moss
Fiscal 1994 sales: $26 million, estimated
Key product: Tivoli Management Environment
Comments: Tivoli Management Environment (TME) is a set of tools that aims to track and troubleshoot network activity in large client/server systems. TME competes with CA's CA-Unicenter framework but is said to hold a key advantage over that product: TME was designed to link to other popular network and systems management products, specifically HP's OpenView and IBM's NetView.

Furthermore, large relational database makers have signed pacts with Tivoli to integrate or otherwise link their products to TME, including Sybase, Inc., Informix and Oracle.

Moss

Radical CHANGE Afoot

Under desktop's expanding role, systems management may never be the same

By Steve Moore

When systems management and network management meet head-on in 1995, the shape of the computer industry may well change.

"As enterprise network management consoles [systems] try to work in new PC LAN environments, they are going to have to adapt as a consolidation point for systems management" or risk being limited to Simple Network Management Protocol network functions, while other products handle every aspect of systems management, according to Chris Thomas, enterprise technology manager at Intel Corp.

"From the applications integration perspective, in 1995 systems management applications will still run pretty much stand-alone relative to network management applications," says Dave Passmore, principal consultant at Decisis, Inc. in Herndon, Va. "There will be very little synergy between the two because we're not yet at the point where we will be able to look at both network and systems elements and provide fault isolation or performance information, for example, on an end-to-end basis."

Upping the ante

As systems management and network management vendors work to build synergy among their products, their success will depend heavily on the quality and structure of the databases they use, says Mike Prince, MIS director at Burlington Coat Factory Warehouse Corp. in Lebanon, N.H.

Prince outlined the following database-related developments he says will add significantly next year to the systems management challenge:

- Parallel database queries spread across multiple processors.
- Clustering of multiple systems around the same disk and coordination of access so all systems can update the disk.
- Replication of data across a network so instead of sharing a disk, multiple nodes coordinate updates to multiple instances of the same database.

"Those things all add complexity to the administration of the system," Prince says. "And they make your requirements for really precise systems management become more stringent."

Consortium at the ready

Supporting precise systems management is what the Desktop Management Task Force (DMTF) industry consortium is all about. By late 1995, users will be able to use the DMTF's Desktop Management Interface (DMI) standard to manage LAN servers as well as LAN-attached PCs. DMI prescribes a consistent way for both desktop PCs and servers to provide information about themselves to systems management and network management applications.

IBM and SunSoft, Inc. have already said they will support DMI in their Unix operating systems by 1995.

"Look to the end of 1995 for the advent of DMI in other server operating systems, including NetWare and [Windows] NT," says Shannon Gray-Voigt, DMTF chairman and industry standards marketing manager at Intel.

Gray-Voigt highlighted the following additional DMI-related trends that will emerge in 1995:

- PC software application vendors will begin implementing DMI. They will initially focus on asset management, auditing and metering functions.
- Computer vendors will begin giving users the ability to retrofit legacy PCs and servers with DMI capabilities so that they, too, can be an integral part of users' systems management domains.

DMI currently specifies management information files (MIF) for hardware (PCs, modems, network interface cards and so on), while MIFs for software packages are slated to be be completed in 1995.

Together, these MIFs will provide detailed information about the hardware and software in each managed device in a client/server network. And systems management applications can use the DMI data to support various systems management functions, such as software distribution, metering and performance management.

- Computer vendors will also begin to use DMI as a basis for remote systems management. Beyond the business office, "we'll see a push toward remote service and support capabilities for PCs in the home," Gray-Voigt says. In 1995, the DMTF will begin working with vendors to extend DMI to support remote desktop systems management, she says, noting that DMTF participants recognize the complexity but intend to deal with it.

> WHILE 1995 WILL BE A YEAR OF IMPROVEMENTS IN SYSTEMS MANAGEMENT, 1996 WILL SEE THE FLOWERING OF APPLICATIONS MANAGEMENT AS A SEPARATE, SOFTWARE-ORIENTED SCHOOL OF THOUGHT DISTINCT FROM SYSTEMS MANAGEMENT, WHICH WILL BECOME MORE HARDWARE-ORIENTED.

As systems management products gain broader functionality in 1995, "we'll see more highly integrated suites of systems management applications that will be managed from a common console with a common database," says Nev Grove, director of product management at Symantec Corp. in Los Angeles.

Grove notes that desktop-oriented management applications such as software distribution packages will also become more tightly integrated with high-end enterprise network management platforms.

Parting of the ways

While 1995 will be a year of improvements in systems management, 1996 will see the flowering of applications management as a separate, software-oriented school of thought distinct from systems management, which will become more hardware-oriented, Thomas says.

"We're not yet hearing from many vendors that are managing the performance and output of specific applications that are running your business," he says.

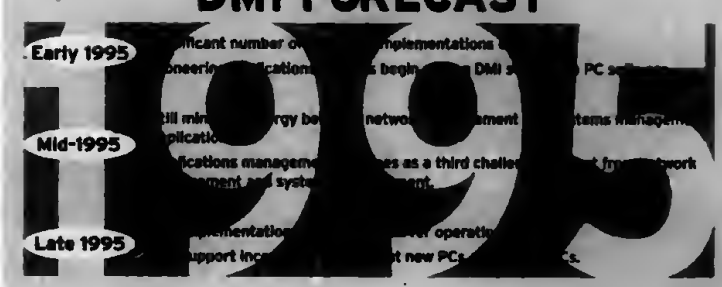
In the future, "the application itself could figure out how to get the most out of the machine it's installed on by looking at the hardware and at other software on the same machine," Grove says.

He adds that DMI will support dynamic, real-time systems management functions as well as more static, archival functions.

Ultimately, as users' systems management capabilities become more sophisticated, they will be able to directly measure and monitor the computer resource use of competing business applications, such as word processors or spreadsheets.

That may not please application vendors whose software turns out to be less efficient than competing software, but it certainly will please users as they move beyond systems management to full-fledged applications management.◆

DMI FORECAST



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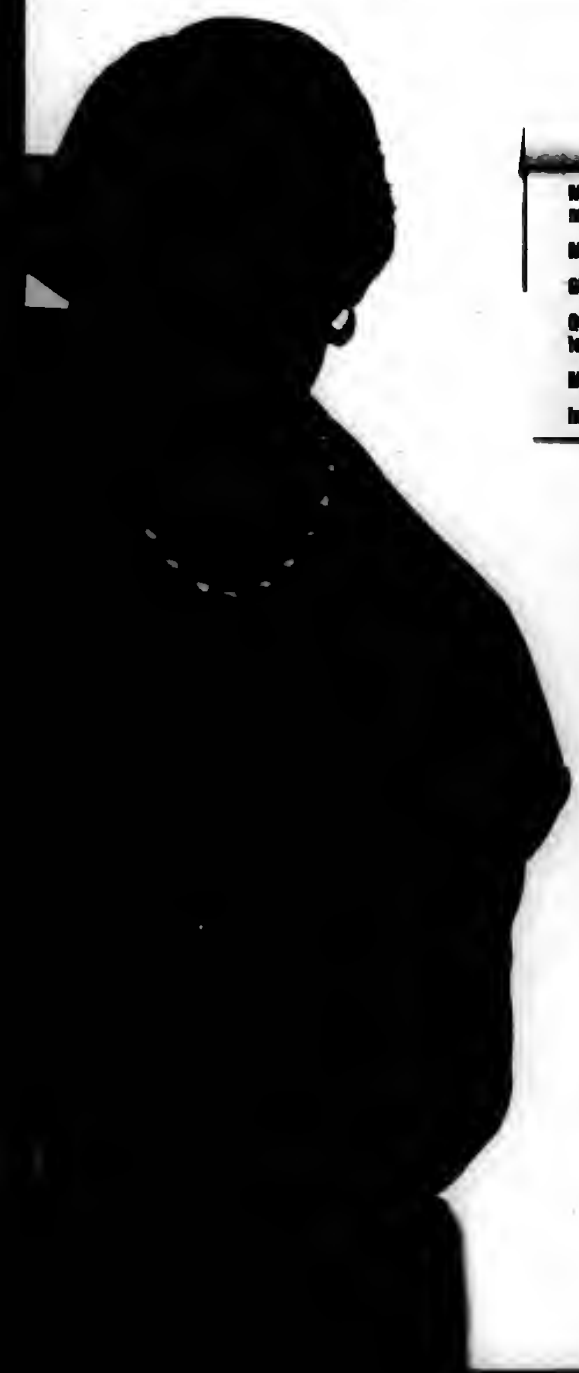

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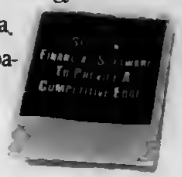

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Sizing up the BIG GUYS

By Mary Brandel and Mark Halper

This was the year that every vendor became a client/server vendor. But their products and prospects are all over the map. Computerworld polled industry opinion leaders to find out how the big-name vendors stack up in the client/server biz. We offer pros, cons and a consensus letter grade.

SOFTWARE MAVENS

COMPUTER ASSOCIATES INTERNATIONAL, INC.

PRO: CA has come a long way in client/server during the last year. Unicenter systems management software is finally catching on in the Unix world, and NetWare and NT ports should be coming. CA now offers Unix applications in banking, human resources and manufacturing. Its acquisition of The ASK Group provides an entree into relational databases.

CON: Customer relations have always been rocky, and CA's legacy as an aggressive enforcer of pricing terms could pose difficulties. Its reputation as a systems software provider could work against it in tackling applications and development tools.

GRADE: B

LEGENT CORP.

PRO: Legent is on the right track with its XPE cross-platform systems management tool. XPE's multiple protocols provide a solid middleware foundation. Legent has a strong revenue base from its history of growth by acquisition.

CON: Legent and third-party vendors have been slow to offer applications that leverage XPE. It is fighting its image and legacy as a player in the mainframe arena where it is still very active.

GRADE: B+

POWERSOFT CORP.

PRO: If the computer industry were a popularity contest, PowerBuilder would win. Powersoft will deliver multiplatform support this year for more enterprise-class apps. Plus, PowerBuilder 4.0 includes data replication and support for OLE 2.0 and ODBC 2.0.

CON: Even with Version 4.0, PowerBuilder is too dependent on client-based processing. Still missing: application partitioning, integrated transaction management and the ability to build apps for a three-tier architecture. No one knows what effect being bought by Sybase will have.

GRADE: A+

SAP AMERICA, INC.

PRO: SAP's phenomenal two-year rise to client/server leadership will make it a $1.2 billion to $1.3 billion company this year, with a large portion of that coming from its 1,800 R/3 customers worldwide. It recently unveiled a bundled system for smaller customers and will ship R/3 Lite this year. Its enormous functionality, strong international capability and worldwide presence should keep SAP a leader in 1995.

CON: There is a side effect to SAP's fast rise. Support issues are stretching the company's resources. A major challenge will be to quickly establish frameworks of technical expertise, particularly in the U.S., and make R/3 easier to use and less expensive for smaller companies. Oracle will undoubtedly turn up the competitive flame this year.

GRADE: A+

BORLAND INTERNATIONAL, INC.

PRO: Borland has finally delivered dBase for Windows and the Borland database engine. It is aggressively stepping up its "upsizing" tool offerings, and the new Interbase for NT is ready to ship.

CON: Simply put, sales. It's not clear Borland will derive enough revenue from its tools and applications to drive a client/server strategy. DBase for Windows so far has had little success, and tools are not a mass market item, although the forthcoming Delphi visual developer is turning heads.

GRADE: C

LOTUS DEVELOPMENT CORP.

PRO: Notes 4.0 should be a winner in the groupware category. It should have better database integration and SMP support than earlier versions. Expect more "pay-per-drink" pricing as Lotus and partner AT&T move out of the pilot stage of a trimmed-down network version of Notes.

CON: Lotus' approach to groupware is not as modular as some of the competition's, and there is plenty.

GRADE: B

MICROSOFT CORP.

PRO: Like it or not, Microsoft has it all on the desktop. NT is building steam on the enterprise. If Windows 95 – perhaps the most successful "vaporware" ever – does all it is said to, it could make Mac OS even more of an also-ran. Microsoft's ability to use pricing as a weapon as well as its control of hardware OEMs is awesome.

CON: If Windows 95 becomes Windows 96, users and independent software vendors may finally lose patience and shift some dollars to OS/2. The company's inability to deliver Exchange, its messaging platform, has hurt its position in the groupware market.

GRADE: A+

SYMANTEC CORP.

PRO: Based solely on name recognition and the current fragmented market, Symantec stands a chance as a distributed systems management provider. It also holds 60% of the PC network utilities market since its purchase of Central Point Software. Symantec's Powersoft challenger, Enterprise Developer, has met with positive reviews. Its second version of PCAnywhere for Windows is said to be more robust than the buggy Version 1.0.

CON: Desktop domination does not necessarily translate into enterprise success. Its traditional business is threatened by Microsoft, which continues to put desktop utilities in the operating system, and by remote access suppliers, which are trying to horn in on PCAnywhere.

GRADE: B+

WORDPERFECT (Novell Applications Group)

PRO: GroupWise, the new groupware product from WordPerfect, includes broader networking protocol support than has been WordPerfect's norm. Its link to Novell lends ample market clout. SoftSolutions should strengthen GroupWise with rich document management features. GroupWise's inclusion in Novell's Corsair product will be a plus.

CON: Lots of entrenched groupware competition, so this will be a steep uphill road.

GRADE: B

DATABASE EXPERTS

INFORMIX CORP.

PRO: Its strengths in parallel processing are a boon to the back end in the client/server world where Informix mixes well with Unix. It has a strong alliance with Microsoft on the low end and NT commitment.

CON: Informix does not seem to care about full-fledged replication, which some users want when they connect databases distributed across multiple sites. Its commitment to NetWare is questionable.

GRADE: B+

ORACLE CORP.

PRO: Oracle is about as much of a one-stop shopping vendor as there is in the database and application world, and it seems to have shaken its legacy as a vendor of proprietary systems.

CON: Oracle and its database competitors face a serious pricing challenge from Microsoft, which threw down the gauntlet earlier this year with a $20,000 unlimited user license. It has been stingy with pre-release code.

GRADE: B

SYBASE, INC.

PRO: As Sybase will gladly tell you, it has been in the client/server game perhaps longer than any other

Illustrations: Lin Wilson

database vendor. Experience counts, and Sybase has grown up on Unix. It also has ambitious plans to support NT, OS/2 and NetWare.
CON: Its historic weakness in development tools should be addressed by its expensive acquisition of Powersoft, but questions abound about whether it can keep Powersoft's products database-independent and still sell them. Sybase faces the same pricing challenges as Oracle, and the fallout from its SQL Server split with Microsoft could prove harmful.

GRADE: B+

SYSTEMS LEADERS

APPLE COMPUTER, INC.
PRO: Apple is regarded by many as the best system vendor on the client side of the equation. New PowerPC systems are its fastest and least expensive desktops ever. IBM's apparent backing of a common PowerPC system design is a boost.
CON: Windows 95 could practically neutralize Apple's operating system edge. Apple needs NetWare support on its servers. Big questions: Will IBM license Mac OS (IBM says no), and will Apple and IBM actually finalize a common hardware platform?

GRADE: Incomplete until Apple moves on its operating system licensing project.

AT&T GLOBAL INFORMATION SOLUTIONS
PRO: By aligning the company behind "customer-focused solutions," AT&T GIS has hit on something that customers actually need: sales/marketing systems that generate revenue. Plus, it has products to back up its claim. AT&T GIS is also viewed as a strong NT integrator and a market share leader in NT servers.
CON: Few understand AT&T GIS' concept of selling systems that are packaged but that also need to be customized. Like Lotus with Notes, the company has a lot of explaining to do.

GRADE: B

DIGITAL EQUIPMENT CORP.
PRO: Digital finally has a client/server tale to tell. Its Unix is technically strong, and it is bolstering NT with management software and possibly clustering this year. Its new Alpha AXP-based SMP servers – finally the right size for NT – are well regarded. Microsoft, Lotus and Novell chose Digital's services group to provide distributed support, and its network group is a well-kept secret.
CON: Many users cannot fathom Digital's strategy. They question its software direction and support for three operating systems. In Unix, Digital must compete with HP, a formidable competitor. Alpha sales now exceed VAX revenue, but that's mostly in workstations.

GRADE: C

HEWLETT-PACKARD CO.
PRO: HP moved to RISC long before Digital and other rivals and is now collecting the dividends. It is strong across the client/server computing board in PCs, workstations, large systems and servers, networking, object technology and management tools. HP is also doing a fine job of opening up its proprietary HP 3000 system and has become a whirlwind of services.
CON: It's hard to find a pressing flaw, but HP's stated plans to move to a "post-RISC" architecture in two years with Intel could ruffle a user base concerned with backward compatibility. HP also has high-end scalability shortcomings.

GRADE: A

IBM
PRO: Customer loyalty is still pretty strong, and IBM has lots of horses in its stable, including multiple desktop and server offerings, networking tools and the ability to tie in workhorse proprietary architectures. Warp OS is gaining speed.
CON: IBM is still encumbered by a mainframe image it may never completely shake. Still in recovery mode and uncertain about strategic directions, IBM supports more than a half-dozen operating systems as well as dual desktop hardware platforms with PowerPC and X86.

GRADE: B+

SUN MICROSYSTEMS, INC.
PRO: By focusing on servers and networking – not workstations – Sun stands a better chance of gaining corporate mindshare. Its Unix servers are now "PC LAN administrators," and it released a faster Solaris that runs on both SPARC and Intel chips and supports NetWare boxes. Solaris will become object-oriented in '95 through the NextStep operating system. Sun reorganized SunSoft into a unified division. Making nice with Microsoft was a good move.
CON: With profit margins narrowing on workstations, Sun needs to push heavily into servers while remaining vigilant on price. It is limited in that endeavor by its single operating system strategy. Although working on its 64-bit UltraSPARC, Sun is currently behind the power curve with its 32-bit SuperSPARC.

GRADE: B

NETWORKING CONTENDERS

3COM CORP.
PRO: This billion-dollar baby has done an excellent job of buying up and integrating router, switching, hub and WAN connectivity technologies. It is well established in local-area and internetworking and has a realistic position on SNA and routing.
CON: The big challenge is to unify its acquisitions under the Transcend management umbrella. Higher port densities, especially in its high-end routers, are needed.

GRADE: A+

BANYAN SYSTEMS, INC.
PRO: Banyan has a new focus: electronic messaging applications. The Beyond purchase and work with Collabra Software portend solid workflow/groupware offerings. Its network operating system-independent network services are now on major Unix platforms. A corporate reshuffling, revived channel strategy and strengthened international focus may improve marketing, its biggest downfall.
CON: This Rodney Dangerfield of network operating system vendors is virtually ignored by big players despite its presence in large networks.

GRADE: C

BAY NETWORKS, INC.
PRO: It took a while, but when the combined SynOptics and Wellfleet finally voiced its view of integrated hub, switching and routing technology for high-speed networks, it hit all the right market trends. Bay's relatively small installed base will allow the company to stay light on its feet and take necessary risks.
CON: Its vision is wonderful, but the market won't be forgiving if Bay cannot follow through and ship products on time.

GRADE: B+

CABLETRON SYSTEMS, INC.
PRO: A well-known and popular hub vendor, Cabletron has a good handle on the evolution toward switching hubs and ATM to the desktop. It has also begun to lay the groundwork for IBM connectivity.
CON: Like Cisco, Cabletron is locked with Bay in a deadly embrace for leadership. It may be tough to retain lone-wolf status in an increasingly consolidating market.

GRADE: B

CISCO SYSTEMS, INC.
PRO: Cisco is the king of enterprise routers. Its clout alone could propel the company into ATM switches and the virtual networking arena. The Kalpana acquisition will boost Cisco's ability to create a switching hub and LightStream should help with ATM.
CON: With ATM around the corner, it needs to branch out to maintain its aggressive growth plans. It must continue to strengthen and deliver on SNA routing and master ATM while not undermining its strength in routers by spreading itself too thin.

GRADE: A+

NOVELL, INC.
PRO: Novell heads into 1995 weaker but wiser: The business is pared down, and "coopetition" with Microsoft has been forged. If NetWare 4.1's directory-building tools live up to their promise, users may be encouraged to migrate to enterprise levels. Other promising developments: NetWare database servers and telecom services.
CON: All of its major products were delayed last year. And as NT threatens to encroach further on would-be low-end Unix environments, Novell's offerings aimed at that sweet spot – wide-area directory services, NetWare 4.1 and UnixWare – have garnered only lukewarm support.

GRADE: B+

NOTE: Analysis and assistance provided by Barry Wilderman, Meta Group, Inc.; Donald DePalma, Forrester Research, Inc., Tom Nolle, CIMI Corp., Bob Sakakeeny, Wayne Kernochan and Charlie Robbins, Aberdeen Group; Nina Lytton, *Open Systems Advisor*; Curt Monash, Monash Information Services; Nancy Stewart and Kimball Brown, Dataquest, Inc., Mary McCaffrey, Alex. Brown & Sons, Inc., and Chet Geschickter, Hurwitz Consulting Group, Inc.

STAY SEATED= More Turbulence Ahead

[redacted] industry

By Stephen P. Klett Jr.

There is no respite in sight for users feeling pummeled by the consolidation craze in the networking arena. Next year promises to bring more of the same as vendors race to bring users the high-speed networks needed to run client/server applications.

The merger of Wellfleet Communications, Inc. and SynOptics Communications, Inc. into Bay Networks, Inc.; 3Com Corp.'s acquisition of NiceCom, Inc.; and Cisco Systems, Inc.'s purchase of LightStream Corp. and Kalpana, Inc. are examples of consolidations that have occurred during the past six months (see chart).

Analysts and users say continued consolidation will deliver the long-term benefit of higher network performance and simplicity via integration of routing and switching technologies. However, for the short term, consolidation is creating a major headache, they say.

"You get two different stories when you ask two vendors what their relationship to each other is," says Farrokh Billimoria, vice president of network engineering at Bankers Trust Co. in New York. "It's somewhat amusing, but it's also very confusing. Just when you think you understand what two vendors see in each other, they go after someone else."

Switching boom

The bulk of the integration activity is centered around the need to acquire LAN and Asynchronous Transfer Mode switching. Devices such as switching hubs promise to boost the bandwidth of users' LANs by either breaking them down into smaller LAN segments or delivering dedicated bandwidth to individual user desktops on a port-by-port basis. Down the road lies the promise of virtual networking.

This bandwidth boost is an immediate concern to users as they implement popular client/server applications, which are pushing network pipes to their limits. For example, documents created using Lotus Development Corp.'s Notes application can contain voice and video clips, making them veritable bandwidth hogs.

Most industry analysts say they expect switching to be the highest area of growth in the networking market for the next several years. The current $200-million switched Ethernet market alone is expected to hit as much as $5 billion in the next three to five years, according to some estimates.

The high-growth appeal of this market spawned a slew of start-up companies in 1994, including Centillion Networks, Inc., Agile Networks, Inc., NiceCom, Xylan Corp. and Amber Wave Systems, Inc. Many of these companies are prime takeover candidates for more established companies with pocketfuls of change, according to analysts (see chart).

Some start-ups believe this puts them in the catbird's seat when dealing with established vendors that are on the acquisition prowl.

"The market is extremely vibrant and large, and there are plenty of opportunities for start-ups," says Bobby Johnson, president of Centillion Networks. Johnson says some companies have already approached him about a possible acquisition, but there are no plans to sell — at the moment. "Our corporate goals are to grow a very vibrant and sustainable business," he says. "You don't have to sell ... but sometimes someone offers you enough money to make up your mind for you."

Taking a shortcut

The quickest way for established vendors such as 3Com and Cisco to get in on the action is to buy switching technology rather than develop it on their own. This is a driving force behind the consolidations.

In addition, switching hubs perform many of the same functions as routers, and users want to see these platforms integrated. This is the main reason Wellfleet and SynOptics decided to merge.

"There is definitely a lot of pressure to bring these technologies together," says Andy Ludwick, president and chief executive officer at Bay Networks in Santa Clara, Calif.

Users, meanwhile, remain optimistic.

Performance issues aside, "I like the idea of having everything integrated into one box for management and floor space conservation purposes," says Bill Blackmer, senior information support analyst at the County Marin Data Processing Department in Novato, Calif., which uses SynOptics hubs. Blackmer says he is bullish on Bay Networks because "SynOptics did not have any routing built into its hub. This was killing them and was the main reason we almost dropped them."

"It's clear that users want and need a box that combines routing and switching," says Robert Pinocchio, executive vice president of network systems operations at 3Com in Santa Clara, Calif. "We all have to have these technologies in various combinations. We can't afford to take a religious stance."

[redacted]

3Com, which makes its own hubs and routers, purchased NiceCom in October to acquire ATM switching. In 1993, it purchased Synernetics, Inc. for Ethernet switching technology.

On the way

So far, however, the shakeout many observers expected would accompany the consolidation has yet to occur, but some think it is looming just over the horizon.

"Once the acquirer's appetite gets full then there won't be any room left on the vine for any of the other fruit," says Craig Benson, chairman and chief operating officer at Cabletron Systems, Inc. in Rochester, N.H. Benson expects consolidation to continue for the near term, followed by some shakeout in the latter half of 1995 and early 1996.

Financial analysts agree.

"We expect to see some shakeout [in 1995]. There are far too many companies at the workgroup level, and natural selection will determine who succeeds or fails," says Kevin Fong, general manager at Mayfield Fund, a venture capital firm in Menlo Park, Calif.

There are literally hundreds of companies focused on building hubs and switches for workgroup applications. The general consensus is these will boil down to three or four multibillion-dollar companies — read Bay Networks, Cisco, 3Com and Cabletron — and a few dozen $100 million firms focused on specific niche markets.

The ATM market is also setting itself up for a shakeout, observers say. "We're going to see a lot of panic surface in the ATM market," says Lawrence Lang, senior product line manager at Cisco. "There are 500-plus vendors right now positioning for ATM, all figuring they can make $100 million. I think I can guarantee ATM's not going to be a $50 billion market."

CONSO[redacted]

ACQUISITION HITS IN 1994

- Artel Communications Corp. David Systems, Inc. (both by Chipcom Corp.)
- LightStream Corp., Newport System Solutions, Inc. Kalpana, Inc. (all by Cisco Systems, Inc.)
- NiceCom, Inc. (by 3Com Corp.)
- Network Systems Corp. (by Storage Technology Corp.)
- SynOptics Communications, Inc. Wellfleet Communications, Inc. (merged into Bay Networks, Inc.)
- Xyplex, Inc. (by Raytheon Co., pending)

POTENTIAL TARGETS IN 1995

- Agile Networks, Inc.
- Alantec Corp.
- Centillion Networks, Inc.
- Fore Systems, Inc.
- Grand Junction Networks, Inc.
- NetEdge Systems, Inc.
- Xylan Corp.

Software Tsunami Headed This Way

By Stephen T. McClellan and Christopher C. Shilakes

Stand back — the turbulent client/server market is surging. Leading player Oracle Corp., with an estimated $2.5 billion in revenue for 1994, is showing revenue for the most recent quarter that is 40% greater than revenue for the same quarter last year. Other major players such as Sybase, Inc. — which is one-third the size of Oracle — are hanging on, trying to control breakneck growth of more than 60% while scrambling to broaden through acquisition.

Databases and accompanying products have taken the lead as the fastest growing client/server market segment, but development tools such as Powersoft Corp.'s PowerBuilder and packaged applications such as those from SAP America, Inc. and PeopleSoft, Inc. are on its heels.

McClellan (left), and Shilakes

As many more companies this year move from pilot client/server applications to enterprisewide implementations, they are choosing not to wade through this spongy ground alone. They're getting help from new-wave systems integrators and application development firms such as BSG, Inc. in Houston and Cambridge Technology Partners, Inc. in Cambridge, Mass. Or they're getting help from their client/server providers.

Oracle's service, consulting and support business, for instance, has ballooned almost 40% over last year's figures and accounts for nearly half of its total revenue. Other vendors such as Sybase and Informix Corp. are also making major investments in this arena. While vendors scramble to fill the demand for services, their service profit margins remain low. But look for these margins to improve over the next several years as vendors learn to run these operations more efficiently.

More widespread corporate adoption of client/server applications is also prompting cries from systems administrators for improved administration and security tools to manage these widely distributed client/server resources. Their pleas have so far gone unheard. But some vendors are moving to fill the gap.

With client/server revenue at just 10% to 15% of its total, Computer Associates International, Inc. is growing in this area at a rate of almost 100%.

Other mainframe-based providers have chosen to enter the game by acquisition. CompuWare Corp. purchased Uniface Corp. to acquire a framework and tools for entering the client/server systems management market. BMC Software, Inc.'s purchase of development company Patrol early in 1994 represented a similar move.

And look for newcomers such as OpenVision Technologies, Inc. and Tivoli Systems, Inc. to gain speed in 1995.

Recent acquisition targets have been small to midsize, narrowly focused companies such as Intuit, Inc. or narrow market sector orientations such as Powersoft. Vendors of application development tools and systems management utilities look like attractive acquisitions for 1995.

Acquisitors will remain primarily midsize vendors seeking broader product lines, distribution channels and the scale to compete against industry juggernauts. Witness Sybase paying some $904 million for Powersoft.

Don't expect industry leaders Microsoft Corp. and Oracle to stand still, though. Oracle's purchase of Digital Equipment Corp.'s Rdb and a midyear opportunistic run at Gupta Corp. to obtain low-end development tools as well as Microsoft's merger with Intuit are just a prelude to 1995 activity.

Continued industry consolidation means added challenge for users. While it may translate into improved financial viability, such upheaval often defocuses company management and disrupts development efforts. So be prepared for the tsunamis of 1995.✦

McClellan is a first vice president and Shilakes is an industry analyst at Merrill Lynch & Co. in San Francisco.

What's HOT and What's NOT

Industry analysts give their 1995 stock market preview

Compiled by Tim Ouellette

Michael Murphy
California Technology Stock Letter, Half Moon Bay, Calif.

PICKS FOR 1995

Seagate Technology, Inc.: Demand for storage is accelerating, and it makes the most money and has the best margins at the high end. [It's] a great way to play to the continued strength in the PC market, and the stock is dirt cheap.

Adobe Systems, Inc.: After the merger with Aldus, it is now a $500 million software company with little overlap from Microsoft Corp. Its niches look to be the fastest growing areas, including multimedia and desktop publishing.

Auspex, Inc.: The demand for Unix servers is growing with client/server's popularity. It has the best reputation based on customer satisfaction surveys, and being in a different category, it is not subject to brutal price competition from Sun Microsystems, Inc. and Hewlett-Packard Co.

PANS FOR 1995

Storage Technology Corp.: It's iceberg product is so late it missed the window and now has brutal competition from EMC Corp. and IBM. The stock is way overpriced, and it is only getting half the price it targeted to have on the iceberg product.

Micron Corp.: The falling prices of [dynamic RAM] due to the increase in foreign production leaves Micron totally exposed, so price reductions go right to the bottom line.

Qualcomm, Inc.: It is pumping [Code Division Multiple Access] as the replacement to the current [Time Division Multiple Access] system, but it has never worked. It is just too late.

BEST PICK OF 1994

Alantec Corp.: I recommended the stock at 10, and it is sitting today at 20 due to the move away from routers to intelligent switching hubs.

WORST PICK OF 1994

Weitek Corp.: We bought it at 3. It went up to 14 then back down to 3.

Thomas Carley
Jensen Securities Co., Portland, Ore.

PICKS FOR 1995

Planar Systems, Inc.: It just came in with a blowout fiscal quarter and is well-positioned for fiscal 1995. The flat-panel market is also growing.

Tektronix, Inc.: The stock has done well. It is starting to show top-line growth, especially with the pickup in Europe and high growth in the color printer group. New management has done well to reduce overhead.

Epyhead, Inc.: New management has revitalized the retail operation. A larger retail format is expected in first-quarter 1995, and the company will benefit from the release of Windows 95.

BEST PICK OF 1994

Planar Systems: Rated a Buy when the stock was at 11, and it went to 19.

WORST PICK OF 1994

None in the technology field.

Jeffry Canin
Salomon Brothers, Inc., San Francisco

PICKS FOR 1995

Parametric Technology Corp.: It had a stunningly good year, with 25 quarters in a row of sequential upticks in earnings. It expects to expand market opportunities with a low-cost version of its software coming out next year.

Autodesk, Inc.: About to release another product in its AutoCAD line.

Silicon Graphics, Inc.: Fundamentals favored.

BEST PICK OF 1994

Autodesk

WORST PICK OF 1994

Cray Research, Inc.

Charles Finnie
Volpe, Welty & Co., San Francisco

PICKS FOR 1995

Avid Technology, Inc.: The leading provider of digital nonlinear video editing systems.

Macromedia, Inc.: The leading provider of multimedia authoring systems.

Edmark Corp.: The leading provider of children's early learning software.

BEST PICK OF 1994

Avid Technology, Inc.: It went from 20 to 42.

WORST PICK OF 1994

Broderbund Software, Inc.: I put a hold rating on the stock when it went from 50 to 70.

David Benham
First Albany Corp., Boston

PICKS FOR 1995

Oracle Corp.: It owns a platform and can set standards. The company is learning to work as a superpower in the industry.

BMC Software, Inc.: The stock is cheap, and it is concentrated on the database – the only area in mainframes that is growing. Databases are also the center of client/server.

Mapinfo Corp.: Its product helps people visualize information to make decisions effectively.

BEST PICK OF 1994

Project Software & Development, Inc.: People had trouble understanding the technology, but when it became public, it came on strong.

WORST PICK OF 1994

Legent Corp.: The most frustrating stock of my life – tremendous potential, yet it hasn't delivered in financial performance.

Bruce Hadburg
Raymond James & Associates St. Petersburg, Fla.

PICKS FOR 1995

Sequent Computer Systems, Inc.: Strong focus on services and enterprise solutions.

Stratus Computer, Inc.: Its penetration with new accounts continues.

Silicon Graphics, Inc.: Strong industry focus; not trying to do everything.

BEST PICK OF 1994

Sequent: Done well since we picked it up.

WORST PICK OF 1994

Unisys Corp.: It is just taking longer than expected for the story to play out.

The Disconnected Worker

Changes in the workforce and in technology are creating the need to support increasing numbers of telecommuters and traveling workers. With 30% of the American workforce self-employed or partially self-employed (and the number rising), supporting a constantly shifting workforce is one of the biggest challenges IS will face during the next several years. Here are some tips on how to accommodate disconnected workers without leaving corporate systems vulnerable.

Out of Sight NOT Out of Mind

Providing round-the-clock support for a remote workforce presents new challenges

By Jean S. Bozman

Proceed with caution. That's the word among information systems executives, many of whom are planning to deploy a new wave of mobile computing applications in 1995.

Sparked by the corporate re-engineering craze and improved laptop computer technology and software, companies are increasingly replicating an in-office computer environment for remote workers. Now, with mobile computers making up about 20% of PC sales and Intel Corp. 1486 horsepower built into many laptops, IS managers are working to give remote users the same levels of support and applications now available at desktop workstations. And using more powerful laptops, IS plans to mint brand-new, cross-functional applications that tap into multiple databases.

"We're going toward the virtual office concept, where you're able to compute anywhere from any location and access databases on demand," says Randy Giusto, associate director of mobile computing at BIS Strategic Decisions in Norwell, Mass. By the late 1990s, "MIS organizations will ask if you want a portable or a desktop," he predicts, "because you can't have both."

Early adopters of remote computing advise drawing up a policy that establishes some guidelines for handling remote workers and starting small with a few high-impact pilot programs.

At the Federal National Mortgage Association (Fannie Mae), 25 regional account executives nationwide are trying out a new set of applications that tap into the mortgage-lending organization's on-line Unix database systems. If successful, the year-old applications will be rolled out by 1996 to more than 200 staffers working remotely.

First, however, IS has to build up industrial-strength software that anticipates real-world conditions, Fannie Mae learned. "Many times, when you're trying to do connectivity over a voice line, you're going to get dropped," says Mike Williams, senior vice president of customer applications and technology integration at Fannie Mae's Washington headquarters.

But with a little planning, solutions can be found that prevent connectivity problems. "If you send across a big blob of data, you're likely to get cut off," Williams says. "But if you send multiple transactions across in sequence, you're more likely to be successful."

Extensive stress-testing by a small team helps make software applications street worthy before they ship to users, he adds.

Dunlop Tire Corp. in Buffalo, N.Y., is outfitting a small West Coast sales operation with remote-computing support for fewer than 10 people, says Chief Information Officer Dennis Courtney. The software, based on Oracle Corp.'s Financials order-entry system and remote electronic-mail links, will let sales staffers draft purchase orders from customer sites by mid-1995. If it goes well, the project will be expanded to other sales regions, including more than 75 sales representatives nationwide.

The greatest challenge for IS is planning and troubleshooting the remote computing technology, Courtney says. "It's getting the infrastructure in place to allow remote access and defining the IS job role to support people in the field," he explains.

Laptops were deployed, along with Microsoft Corp.'s Office software, to get remote workers accustomed to the new computing interface that will be used for the client/server order-entry applications coming in 1995. "By the time they have access to the information databases, our mobile workers will already know how to use the new technology," Courtney says.

Some senior managers still fret about managing employees who are out of sight and wonder how to ensure that they spend their time productively. But management consultant Tom Peters, who co-authored the book *In Search of Excellence*, says managers must learn to trust remote workers to do their jobs.

Electronic surveillance will not help matters either, Peters says. "The firms that are spying and counting log-ons are going to screw it up, and [they] deserve their sorry fate," Peters says. "They're not going to get the great workers, and they're not going to create interesting things. In an age when you create value by doing good stuff with your head, you can't go back to treating people like children."

Remote end users also need better help desk support, particularly with regard to communications links, experts say. Some companies have started outsourcing help desk support to broaden coverage for mobile workers, who often call for assistance at night or on weekends.

Help desks may need to be redesigned or placed inside business units, according to Kevin McManus, director of KPMG Peat Marwick's mobile computing practice in Radnor, Pa. "This technology requires a new IS infrastructure to support it," he says. "That should be figured out as the system is being put together so that the company isn't blindsided by the support requirements of operating [remotely] on an ongoing basis."

Even so, senior management has set the direction for more mobile workers, and IS must follow the strategy. "IS has to provide the connectivity and the necessary tool sets to allow the workers to do what they do in the office," says Gene Friedman, vice president of applied technology at Chase Manhattan Bank N.A. in New York.

Security is still a concern for central IS management. "I don't think it's ever possible to control 100% of everything," says Laraine Rodgers, former CIO at Xerox Corp.'s U.S. Customer Operations Division in Rochester, N.Y., and now vice president of IS at Bell Atlantic Corp. in Silver Spring, Md. But for many IS managers in industry, she says, "There is an anxiety about security on the network."

To combat worries about break-ins to corporate systems, many remote users log on to the computers at headquarters using a multilevel password. Many sites also require field em-

ployees to dial into a call-back modem as a way to verify user identity. Rodgers says some firms have decided to focus their security measures on key entry points in the network because all computers cannot be defended by IS.

Despite the concerns, the office is becoming a thing of the past for many employees. Illinois Central Corp., a Chicago-based railroad, recently closed down an Edison, N.J., office and effectively put four marketing representatives in New York and New Jersey permanently on the road.

"Many of our marketing people are now basically working from their homes," says Norman Schwarz, director of technical support at Illinois Central. "One person lives in Brooklyn," Schwarz says. "She's got a printer, a PC, a fax and phone numbers, and she's all set." Future applications — as yet undeveloped — will let such users waiting for a meeting at a customer site look up that customer's shipping profiles, Schwarz says.

Railroad mechanics at Illinois Central use a different kind of mobile computer than marketing reps; handheld devices record railroad-car repairs for scheduling on the company's IBM mainframe.

The hardest part

Sometimes the toughest hurdle when disconnecting the workforce from the office is breaking emotional links to working in an office environment.

Xerox plans to use laptops to keep its 4,000-plus sales reps on the road most of the time [CW, Oct 31]. Office time will increasingly be spent in common office spaces or even in a type of cubicle known as a telephone booth, says Sean Connellan, manager of strategic planning and operations support at Xerox's U.S. Customer Operations Division.

"When people are packing up their boxes, the notion is the office is kind of gone," Connellan says. "The reality hits them pretty hard." But while Xerox plans to reduce office space by 30% to 50% through its sales force automation plan, the office will retain its role as a meeting place. "The office is still there," he says. "They can still go into that building for support and to find a productive place to sit and work."✦

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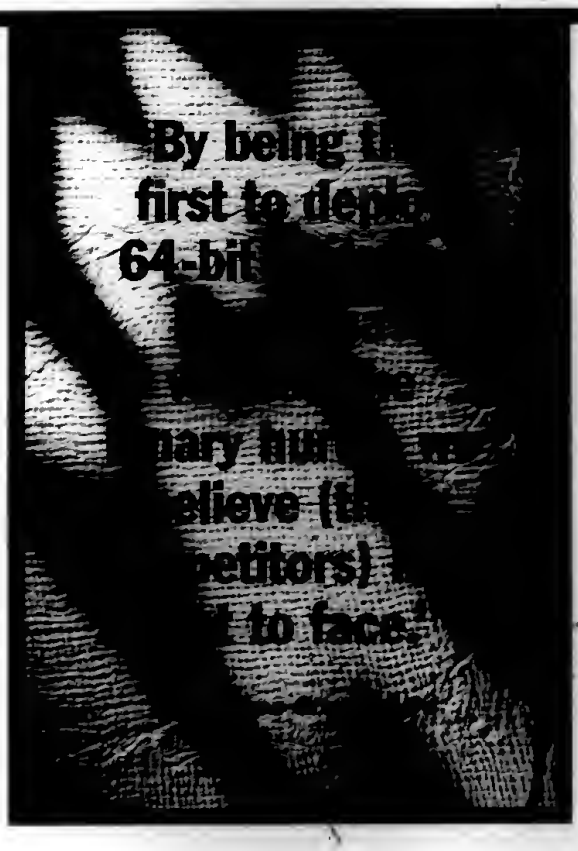
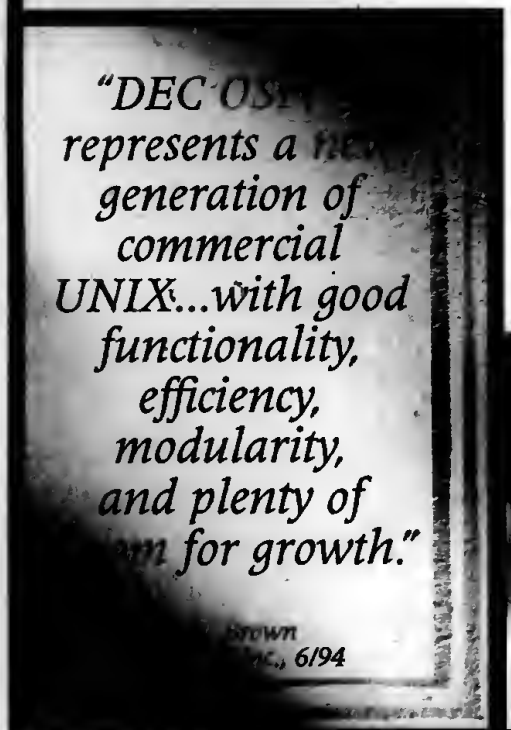
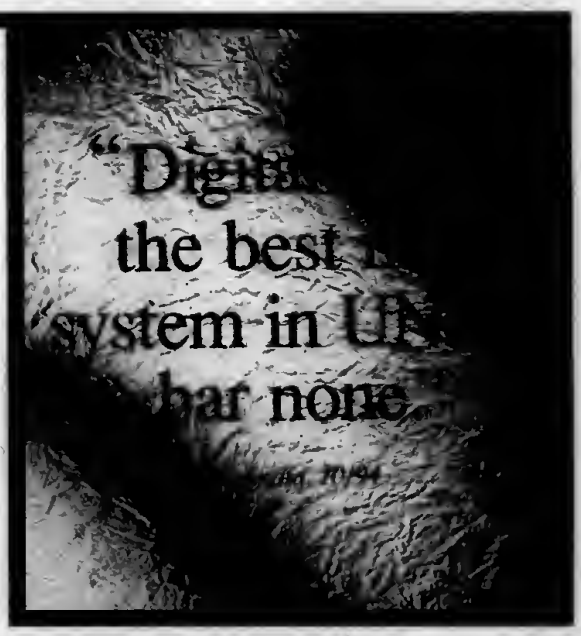




But maybe you *should* get *a* second opinion.



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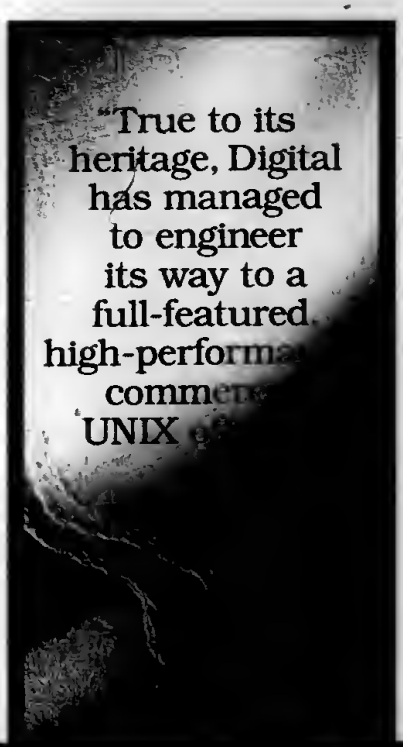

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The Future: UNPLUGGED

Wireless buzzwords you've just got to know

By Michael Fitzgerald

Circuit-switched cellular
The analog voice network is broadly in place and has had time to have its kinks worked out. Circuit-switched cellular, which uses standard analog signals, is a better approach for long data files than packet networks. But it's set up to transmit from tower to tower, which means signals weaken toward the edges.
Pros: It's here now, it has broad coverage, and it works.
Cons: It's expensive, with lots of extra charges above the service charge; it has poor security and reliability.
Price: Depends on several factors but can cost 35 cents per minute to send a message regardless of length.

Cellular Digital Packet Data (CDPD)
It leverages carriers' experiences in building cellular voice service — meaning billing and interoperability issues such as roaming will be fixed. Digital technology sends bursty packets at up to 19.2K bit/sec. and builds on analog tower technology.
Pros: It has broad industry support, big backers throwing big money at it, a fairly low price and good mind share.
Cons: It's not here yet, it's overhyped, and it has questionable accessibility in high-use areas; it has unproven reliability and throughput.
Price: 12 cents to 19 cents per kilobyte (for GTE Corp.'s CDPD service), plus basic service rates. Users must also factor in roaming costs.

RAM Mobile Data/ARDIS
Packet radio networks. ARDIS is better at in-building transmission; RAM Mobile Data has more effective traffic optimization. Both have top speeds of 19.2K bit/sec., though most of the ARDIS network runs at 4.8K bit/sec.
Pros: They're here; they work; they're fairly inexpensive.
Cons: Coverage is limited, they're difficult to develop applications for, and long-term viability is a question.
Price: ARDIS charges 6 cents per message, plus 3 cents per 100 characters in prime time. RAM Mobile Data costs approximately 3.5 cents per message.

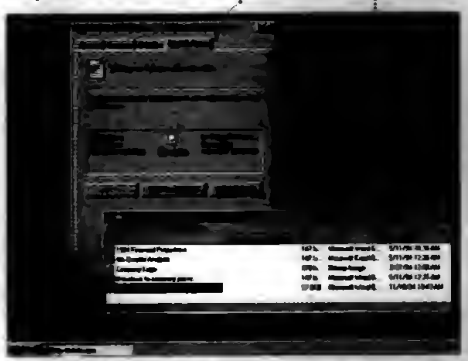
Metricom, Inc.'s Ricochet Microcellular Data Network
Operates in unlicensed 900-MHz band using a small, inexpensive radio transmitter; it is set up in a mesh configuration, so radio signals bounce to various transmitters rather than the point-to-point cellular network configuration.
Pros: Cheap, easy and fast.
Cons: Haphazard deployment; may never be nationwide.
Pricing: As low as 6 cents per minute, comparable to land lines.

Tapping in from the Road

Weave remote users into the corporate web by building on what you have

By Stuart J. Johnston

During mobile computing's Paleolithic period, back when it was still miraculous that users could communicate at all, the travails of being a user on the road were fairly basic. Often hotel telephones were hardwired, and traveling users had to improvise, carrying with them alligator clips, a screwdriver, pocket knife and maybe even an acoustic coupler for those really intractable situations.



Microsoft's Windows 95 will offer a Briefcase feature that lets users synchronize copies on a desktop hard drive and a laptop

Now, mobile users are not just expected to stay in touch with the main office; they must function as if they were in the office, even at an altitude of 35,000 feet.

Consolidating this vast information flow and making it easier to retrieve and respond to messages and other information from the road are definite trends for mobile users in 1995.

Boost from Windows 95

One trend that is certain is that much more of the technology for the information management task will be incorporated into the operating system in the next 12 months, specifically with the delivery of Windows 95.

When Microsoft Corp.'s 32-bit, pre-emptive multitasking, multithreading desktop operating system rolls out about midyear, it will come with several new features aimed at aiding the mobile user.

Most noticeable, perhaps, is Windows 95's universal electronic-mail client, called the Microsoft Exchange client. It will provide a focal point for mail from various E-mail systems — either the user's internal company system, a commercial service or the Internet. The Exchange client will also send and receive faxes. All of these will be consolidated under a single interface, making it simpler to check in.

Other features of the Exchange client also aim to simplify the information glut. For example, much like the facility currently available to Microsoft Mail users, Windows 95 will allow users to download just the header for Internet E-mail messages to decide which messages to read from the road and which ones to leave for later.

A version of Windows beyond Windows 95 will also let users collect voice mail from inside the Exchange client. Even further out, Microsoft plans to extend that capability to animation and video mail.

Another Windows 95 feature aimed at mobile users is the Briefcase.

The Briefcase will enable a user to transfer files from the hard disk on a desktop PC to a laptop and automatically keep copies of those files in synchronization. The user can work on the files from the road and, upon returning to the office, choose to keep different versions or overwrite the older files with the newer versions, says Rogers Weed, group manager in Microsoft's Personal Operating Systems division. While these capabilities are available today on advanced add-on products such as Traveling Software, Inc.'s Laplink, this is the first time such a feature will be incorporated in the basic operating system.

Plug and Play is a phrase that users will hear more often in the coming year. It refers to a hardware and software specification that enables conforming equipment to be inserted and removed from a system, and presto — it installs and deinstalls itself automatically.

For users of laptops who employ docking stations to let the same machine double as a portable and a desktop, Windows 95's Plug and Play support means the system knows when the PC is attached locally to a LAN and when it is not.

When the user is not attached locally to a LAN, Windows 95 will know how to dial up the LAN using Remote Access Services. The user's procedures will remain the same, no matter which type of connection is required. When the user returns to the office, Windows 95 will automatically re-establish the user's LAN connection.

Plug and Play also ensures that when the user begins to undock a laptop from its docking station, the machine will check whether the user still has files open on the docking station's nonportable hard disk or on the network. If so, it will prompt the user to close the files before undocking.

When Plug and Play-enabled printers with infrared sensors become available, a user with a Windows 95 laptop will be able to take advantage of such a printer merely by coming within range of the infrared sensors. An icon repre-

senting the printer would appear on the user's desktop, indicating that the printer was available.

Lotus' Notes

Making laptop computers into more full-function communications appliances is one way of empowering telecommuters. However, users may not always have their portable PCs handy.

Cambridge, Mass.-based Lotus Development Corp. announced two services in late 1994 that may help in those circumstances.

First, it announced the availability of Version 1.1 of its Notes Pager Gateway, which now lets a Notes application send a message to most pagers supported by the major pager systems vendors, says Chris Wraight, Lotus' director of marketing for mobile computing. A similar gateway, which shipped in September, lets CC:Mail users send pages as well.

"What's coming [in the future] is two-way paging, [which would] enable you to scroll down through a list of prestored responses and send it back," Wraight says.

The company also recently released its Mobile Phone Notes E-mail Reader, which enables a user to call in and have E-mail read back over the phone via voice synthesis, Wraight says.

"Another thing we're doing for mobile users is making it easier to do replication. Now, you have to dial in to multiple servers, [but] in Notes 4.0, you'll only have to dial one server," Wraight says. Notes 4.0 is due about midyear, he adds.

"Some other things we're working on [for Notes 4.0] is full replication of Notes databases over analog cellular and digital wireless [links], including CDPD," Wraight says.

Users of CC:Mail Mobile for Windows have not been left out either. It "allows you to set up an icon, say, labeled 'home' or 'hotel' so that it can dial using an 8 or a 9 [access number] so you don't have to remember modem strings," Wraight says.

Novell's GroupWise

Not surprisingly, at least one Lotus competitor is working toward delivering many of the same capabilities to mobile users.

Novell, Inc. is already shipping wireless support in its GroupWise product, which "goes beyond E-mail" to provide calendaring, scheduling and task management, says Stewart Nelson, vice president of research and development for GroupWise.

The Provo, Utah-based company also recently began shipping its Telephone Access Server. "From any telephone in the world, I can have my E-mail, calendar, schedule and tasks read to me," Nelson says. Users can reply to messages as well, sending a voice message as an attachment to an E-mail response.

"Basically, you can do anything from a telephone now that you could do from a laptop in the past," Nelson says. Novell also offers a paging capability similar to that offered by Lotus.

In the next year, Novell will provide remote and mobile users with the ability "to go into a document management server and have [a document] sent to me via fax or downloaded," Nelson adds. Although he did not go beyond generalities, Nelson says the company will also "be doing some things with discussion databases like [Lotus'] Notes."

No matter what else happens in 1995, it will be harder for mobile users to beg off on work tasks that they previously needed to be in the office to perform. ✦

The Totally Wired Road Warrior

Today's mobile executive never has to be out of touch with the office if arms, back and budget can stand the stress.

Wireless phone
Rolmphone 900 wireless system from Siemens Rolm Communications. Intended for users at a local site who want access to a PBX without a wire. Price: $1,500 and up.

Pager
Pagenet Advisor includes four-line message display. Price: $24.95 per month, including service.

Laptop
Texas Instruments TM 4000M multimedia portable includes a 75-MHz 486DX4 processor, 4M bytes RAM, a 455M-byte hard disk, a 9½-in. passive-matrix color screen, 16-bit sound, a PCMCIA slot. Price: $4,799.55 at Computer City.

Portable printer
Hewlett-Packard DeskJet 320 prints 300 by 600 dot/in. at 3 page/min. Color kit and battery optional. Price: $369.55 at Computer City.

Portable modem
Ericsson GE Modibem. 6K to 8K bit/sec. with RAM Mobile Data wireless messaging service. Price: $398 plus $89/mo. for unlimited two-way messaging.

Photo by Russell Quackenbush. Laptop and printer courtesy of Computer City. Other equipment courtesy of manufacturers

The Stuff of Nightmares...

By Suruchi Mohan

A reporter, fired from a newspaper in Florida, went to work for the competition. Shortly thereafter, the new newspaper began scooping the old one on local events that the old newspaper had been investigating. A few scoops later, the old newspaper looked at entry points to its network and found that the fired reporter still had access privileges, which essentially let him slip into the system and preview all stories in progress.

A computer hacker requested a vanity phone number from the phone company. He deliberately chose a number that was the same as a major bank's online dial number — with the last two digits transposed. He then designed a screen identical to the bank's dial-in screen. When users dialed the bank's number incorrectly and got the hacker's screen, they unsuspectingly entered their identifications and passwords. At that point the hacker's system sent them a message saying they would have to redial because the bank was unable to process any transactions. The hacker, meanwhile, had recorded the information for his own use. He bragged about it on a bulletin board and was caught.

Two companies were competing for a large contract. An executive at one of the companies kept the bidding information on his laptop, which one day mysteriously disappeared. No other computer in the office was stolen and no other computer held that information. Although there was no clear evidence that the competitor had a hand in the laptop's disappearance, the coincidence was suspicious.

About time security shapes up

These types of stories from consultants, rushed to the crisis scene by distraught company executives, go on. Many companies continue to be lackadaisical about dealing with the unusual security problems posed by networks that are accessed remotely.

But information systems managers and consultants agree the security issue is growing more acute as more corporate data is stored electronically and accessed remotely.

"Remote access is probably the single most important issue" to system security, says Bill Aerts, information security consultant at Burlington Northern Railroad Co. in St. Paul, Minn. At his company, management wanted more modem lines, but Aerts refused, saying the network is already large and he lacks adequate tools to monitor it. With more modems, it would be impossible to track all the remote dial-up lines, he says.

Requires a lot of hard work

Maintaining security is a grind-it-out, labor-intensive chore, particularly in the client/server world.

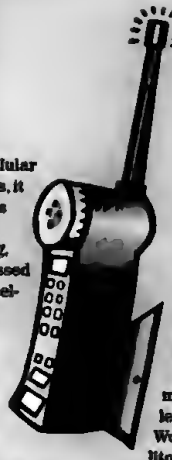
"The issue is not dial-up access. You have to support that," says Charles Wood, an independent systems security consultant at Information Integration Investments in Sausalito, Calif. "The question is, how will you secure it for a particular environment? Each firm will have to do it on its own as there are no off-the-shelf products," he says.

Wood adds that although they're not inherently security averse, modems do leave large

WHO'S LISTENING?

Wireless data transmissions can be secure

By Mitch Betts



Given the headlines about the embarrassing tapes of cellular phone calls made by Princess Diana and other notables, it should be obvious that cellular phone calls are about as confidential as a radio talk show.

In fact, experts say sensitive business topics such as bidding, pricing and legal or financial strategies should never be discussed on cellular phones unless the traffic is encrypted. Otherwise, cellular conversations can be plucked out of the air by scanners that cost as little as $99.

Unfortunately, these alarming reports may be scaring network managers away from a new breed of wireless data networks that have surprisingly robust security.

The coming year will see the deployment of wireless networks based on Cellular Digital Packet Data (CDPD) technology.

"CDPD will take off in 1995 and provide an element of security that has not been available before," says Phil Evans, director of telecommunications planning at Perot Systems Corp. in Richardson, Texas.

For starters, CDPD traffic is hard to monitor because it is made up of packets of data, which fill in the gaps of voice traffic and hop among different frequencies before being reassembled. That kind of setup makes it hard to isolate on a scanner.

But there's more. CDPD modems scramble the airborne data using public key encryption from RSA Data Security, Inc. in Redwood City, Calif. They also provide a frequently changing identification number for the user's device to thwart hackers who capture ID numbers.

On top of that, corporate network managers can add their own security measures, such as adding encryption for the land-line portion of a call or building a firewall, which is a router with access-control software that protects internal corporate networks.

Another recommended approach is to beef up the security of wireless networks by adding smart cards to the digital device for user authentication. For example, the SecurID card from Security Dynamics, Inc. in Cambridge, Mass., produces a different user ID code every 60 seconds.

Similarly, the new PersonaCard 100 will be available in January from National Semiconductor Corp. in Santa Clara, Calif. The $250 card, which plugs into a PCMCIA slot on desktop and portable PCs, handles user authentication, encryption and digital signatures.

But the wireless world still needs better network management systems so network administrators can monitor the wireless traffic and spot suspicious activity, says Charles Cresson Wood, an independent information security consultant in Sausalito, Calif.

One of the scarier predictions for 1995 comes from M. E. Kabay, director of education at the National Computer Security Association in Carlisle, Pa. Kabay predicts that some company will start sending credit-card numbers over wireless networks — without taking enough security precautions — and get stung by a massive credit-card fraud. A hacker need only record the wireless data traffic and use pattern-matching software to identify credit-card numbers.

That, Kabay says, will make October's $50 million toll fraud, where an MCI Communications Corp. employee sold 60,000 calling-card numbers to a crime ring, seem like small potatoes. ✦

holes in the network if not properly secured.

"Modems pose a security risk [because] you put the attacker closer to the system," says Ken Cutler, vice president and director of the Information Security Institute in Woodbridge, Va. Many companies still do not have baseline security measures in place, he says. These include password management, strong control of privileged authority, audit trails of failed log-in attempts and authorization for a minimum of people who can modify data on the network.

Wood agrees. "You'd be surprised," he says. Even companies that seem to be well managed lack basic security measures. Sometimes the measures are in place theoretically, but there is no compliance.

Expensive but worth it

Challenge-response is one of the more sophisticated procedures that some companies are implementing to reduce the risk of unauthorized entry, says Ray Pickholtz, professor of electrical engineering and computer science at George Washington University in Washington. Users are given a handheld device into which they insert their personal identification numbers (PIN). The device generates a one-time password that is sent by the remote computer to the host, which then sends a query back to the remote user. The PIN never goes over the phone line.

These systems, though effective, are expensive. The up-front fee for an access control device ranges from $10,000 to $15,000. This device sits "in line" between the user and the machine. Cards are an additional $50 to $150.

In a study Wood conducted of 40 of the largest commercial banks in the U.S., he found that 89% of respondents were using extended user authentication, which means more than a mere password. Of these, 57% were using identity tokens; 27% were using callback.

Although more secure than a permanent password, challenge-response is not foolproof, Pickholtz says. A disgruntled network administrator who has access to all the PINs can manipulate the system. In fact, employees or former employees — like the newspaper reporter — have the potential to be big hazards to organizations not alert to security needs.

"Usually, the weak points are not sophisticated tools but disgruntled employees or just a friend getting together with somebody," Pickholtz says.

Companies have to be especially careful when firing technologically savvy network managers. Wood cites a company that called him in to change all the router and computer addresses on its network as a high-profile network manager was being escorted out the door. But most companies are not so quick to head off that kind of problem.

Viruses more of a threat

Not that vindictive individuals are the only ones who cause damage. The threat of computer viruses has worsened as more users connect to on-line services and carry disks back and forth between home and office, says Barry White, manager of IS auditing at Johns Hopkins University in Baltimore. The risk is especially grave when people travel abroad with portable computers and exchange disks with the local population. These disks often contain viruses. In one instance, a virus scanning program detected 30 viruses on a system belonging to a professor who had just returned from abroad.

Finally, as the case of the missing laptop illustrates, users of portables must be careful. "A year or two ago, [portables] were being stolen because they were novel; now, [it's] because of the information they have," Aerts says.

From the corporate perspective, all portables should be accounted for by the company, Cutler says. For individuals, preventing theft of hardware or data is a matter of common sense. Users should not leave computers lying around, and they should use data encryption techniques for all their data. Users should also be aware of people who might be shoulder surfing, he says.

Shoulder surfing is fairly common in airplanes, and all users need to be aware of it. LCD laptop screens are visible from several rows back on an airplane. Cutler says once when he was working on a proposal on a plane, a passenger sitting several rows behind told him his work might sound better if he changed the wording a little.

Overall, computer security is a cops and robbers game — the better equipped the cops are, the smarter the robbers get. But as in everyday life, IS managers can reduce the risk of attack with common sense. ✦

Home Alone

How companies are handling their work-at-home employees

By Jaikumar Vijayan

A sampling of corporate policies on home computer use shows some broad guidelines for work-at-home computer users and a lot of flexibility. Some major similarities in corporate policies include the following:

- Most work-at-home requests are handled at the department level.
- The number of employees working at home at least once a week cannot be easily identified, managers say, because it varies and is not tracked.
- System entry is typically governed by password identification, and employees have access to most of the same applications and software they have at work.
- Companies typically reimburse employees for hardware, software and the communications required to work from home.

PRICE WATERHOUSE in New York is one of the nation's top accounting and consulting firms.

"We want to be more flexible with our workforce by allowing them to work when they want to," says Sheldon Laube, national director, information and technology.

- The company provides computers to all employees approved by managers to work from home.
- The company has negotiated agreements with software vendors that allow users to use most company-licensed software at the office and at home.
- Users can dial into the corporate LAN in a variety of ways, such as through Shiva Corp.'s LAN Rover or via Notes. Access is governed by passwords. The company pays for required software and hardware.

PRINCIPAL FINANCIAL GROUP is a financial services firm in Des Moines, Iowa.

"Like any other company perk, the alternate work hours plan is an additional benefit [that accrues] over time for eligible employees," says Leslie Peckham, technology development analyst, pension business unit.

- An estimated 500 out of 6,500 eligible employees have at some time worked from home.
- Users can dial in remotely to their office desktops using specially configured versions of Symantec Corp.'s PCAnywhere software. To get into the corporate LAN, a user's access request is routed to a communications server that identifies and verifies the request.
- The communications server is operated by corporate auditing and control.
- In addition to identifying themselves to the server, users must pass redundant security checks to gain system access.

MILES CORP., a division of the German firm Bayer AG, is a conglomerate based in Pittsburgh.

"I see an emphasis on mobility. A lot of the orders we are placing right now are for notebooks and laptops with a lot of horsepower, larger hard disks and full software suites," says James Baehr, manager, communications, technical procurement and services.

- No formal telecommuting policy is in place yet, but Miles is investigating setting one up. So far the company has worked on a case-by-case basis. When an employee is on maternity leave or disabled, Miles makes arrangements for that employee to work from home.
- Miles looks for licensing agreements that let company software be used at home, provided another copy is not in use at the same time.
- Security is ensured by requiring remote users to input matching parts of a precoded algorithm.

BURGER KING, INC., one of the country's largest fast-food chains, is based in Miami.

"So far we have seen little reason why people need to work from home, except in certain specialized instances," says Aijaz Nawdhia, LAN administrator.

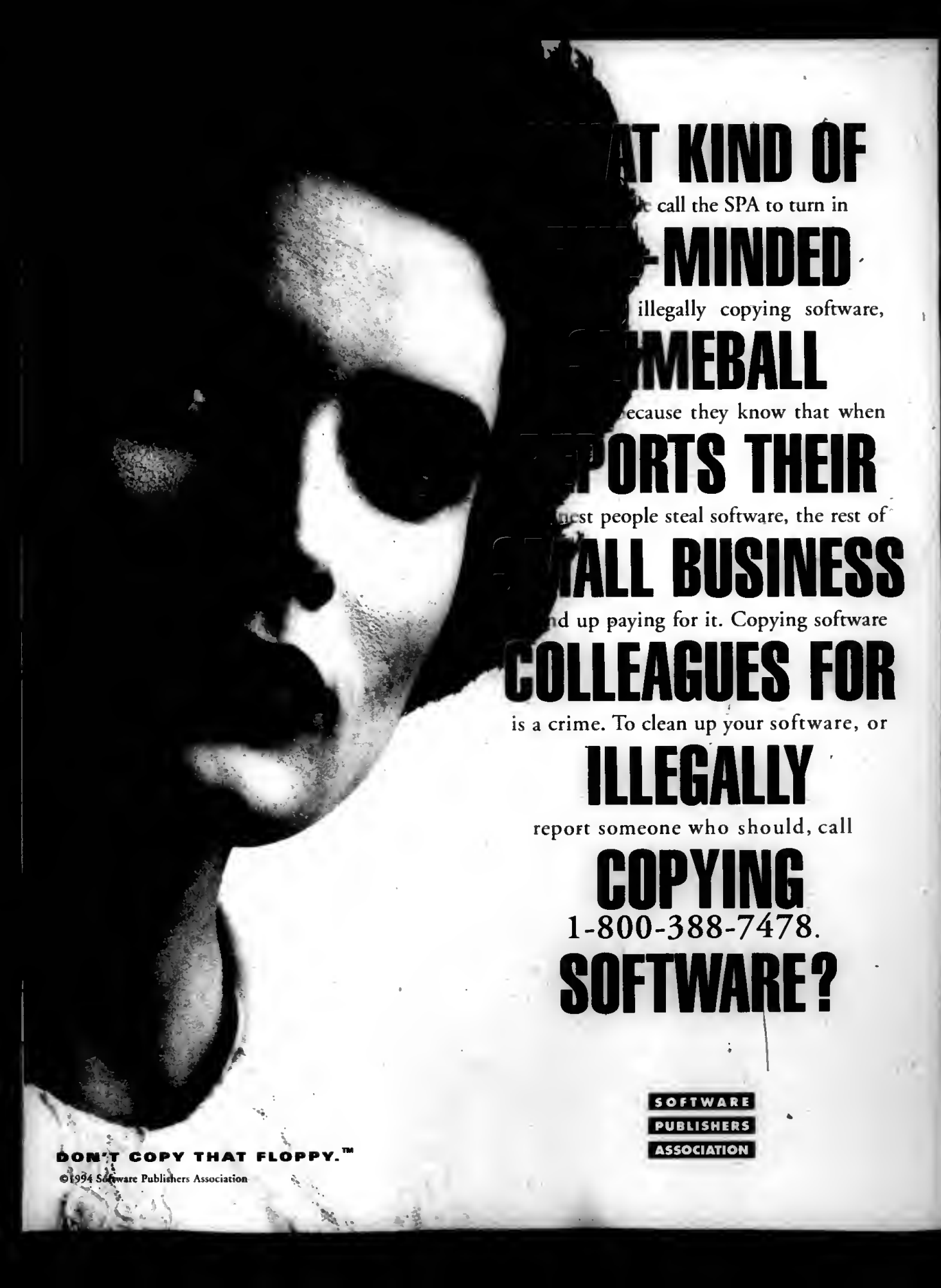
- Users get dial-in access to their office desktops through ReachOut communications software from Stac Electronics, Inc.
- Home [illegible] all of the software [illegible] desktop end access the corporate server.
- The server can also be accessed through Notes and Shiva's LAN Rover.
- Rumba from Wall Data, Inc. allows home users to work in a mainframe-like environment if required.

KENNAMETAL, INC. in Latrobe, Pa., is a multinational manufacturer and distributor of carbide cutting tools with locations in North America, Europe and Asia Pacific.

"There is no formal policy for work-at-home users. It is under each manager's control. If people want to work at home, we give them computers," says John Smith, manager, end-user computing.

- All work-at-home users are equipped with company-owned hardware and communications software.
- Kennametal sales staffers and other employees make use of laptops and notebooks. The company recently purchased 450 Pentium-based laptops.
- Employees access servers through dial-up modems and a dedicated Integrated Services Digital Network line.
- When necessary, the company also installs or pays for phone lines.

Illustrations by Ellen Pechnik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A few more tips on 'Breaking the news'

Downsizing isn't an event; it's a new corporate culture. "Breaking the news" [CW, Nov. 28], which presented tips for telling staff members about a corporate downsizing, was excellent but covered only the tip of the iceberg. Downsizing goes beyond management and requires new leadership; your company will never be the same.

The best advice is to ensure that the announcement isn't news to anyone. Downsizing should be preceded by a solid human resources system that sets performance goals for employees and provides results-oriented appraisals. In most cases, corporate survival means that management must share more information with employees as soon as possible. Those who leave will better understand the situation, and those who stay will sense a greater corporate ownership as members of the new post-downsizing "team."

Steve Edens
The Computer Group/USConnect
Columbia, S.C.

Think again

Charles Babcock tells us that "Object developers should think Small" [CW, Nov. 7]. I would suggest that readers consider the following relative weaknesses in the Smalltalk programming model:

- a Smalltalk fails short in multiple-person projects and interfacing to external hardware.
- Making on-the-fly modifications in Smalltalk does not promote rigorous testing, which puts the burden of finding the bugs on the customer.

From an engineering perspective, it seems the corporate world would need more discipline than Smalltalk provides.

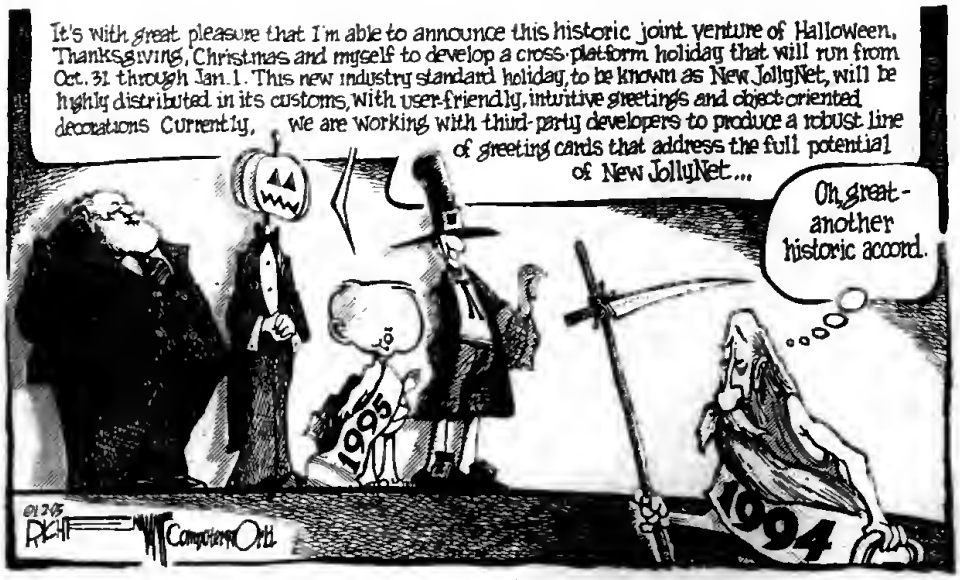
Paul Pukite
Minneapolis

Don't be fooled

The last line in "Tool time" [CW, Nov. 21] — "A fool with a tool is just a faster fool" — is the most telling. Experienced people with sound business process re-engineering methods can succeed with the most basic tools; the best re-engineering tools in the world can't overcome bad methods.

It has been my experience that the greatest savings from re-engineering come from improving the way the organization carries out its mission and not from new programs.

L. Joseph Dunn
Burbank, Calif.



Breach of contract?

"Unsafe at any speed" [CW, Dec. 5] indirectly questioos whether Intel might be liable to its customers for damages.

In fact, under the Uoiform Commercial Code (UCC) and most states' enactmeot of it, a consumer has certain rights accrued through purchasing a good from a vendor, including an implied warranty that the good will do what the vendor says it will do. Failure would be coosidered a breach of the implied warranty.

The consumer is generally prohibited from waiving this right. Many vendors attempt to throw language in their preprinted warranties to eliminate the rights under implied warranty; the UCC generally does not allow such language to be effective.

The real issue is whether a vendor would knowingly sell a defective product. With deception by a vendor, the concept of "strict liability" would apply, exposing the vendor to liability for consequential as well as direct damages.

It is like a hypothetical automobile manufacturer producing a truck known to explode in an accident and deciding it is cheaper to pay off the few informed consumers than fix the problem.

Does this apply to Intel's decision-making? Good question!

Gerald L. Clarke
Boston University
School of Management
Boston

Bugs are here to stay

Hypothesis: The Pentium bug is a sign that from now on, all chips will have bugs. I suspect that Pentiom and other ehips have erossed the tbreshold of complexity; from now on CPU bugs will be a fact of life, just as operating system bugs have long been accepted as a fact of life.

The issue now is oot "How do we make CPU ehips bug-free?" but "How do we manage our lives involving CPU chips with bugs?"

Isaac Malitz
Sherman Oaks, Calif.

Be careful what you ask for

Your enthusiasm for the Republican victory ["High-tech execs, IS shops cheer GOP takeover, plans," CW, Nov. 21] misses some important points. Workers in rural America may provide nice cheap labor for assembling computers, but if Newt Gingrich has his way, they will soon be locked out of the information highway.

Republican rhetoric may sound like information for all, but what it means is information for those who can pay for it. And you can be sure the price will be high enough to keep out "undesirables," such as students at public universities and many middle-class workers. Voters are going to get exactly what they voted for, but it will not be what they expected.

Jay Putt
Hauppauge, N.Y.

Strained relations

Charles Babcock missed the mark — substantially — in "OLAP leads the way to post-relational era" [CW, Nov. 21]. In his blithe broadside on relational databases, he demonstrates that he not only has no idea what relational databases can do but also proves that he doesn't even know what they *are*.

Relational databases are the only databases that have even a theoretical fooodatioo to build on. Thanks to the work of industry pioneers soeh as E. F. Codd and C. J. Date, the relational theory has been hammered out and refined, and the databases have beeo built on top of it. No other principle of database design can make that claim.

Roger B. Thomas
Port Huron, Mich.

I hope readers will resist the temptation to rush out to purchase the latest software versioo of cold fusion.

We continue to believe that somehow software will defy the laws of physics and produce more output than there is input. The total number of brain cells used oo design and CPU cycles nsed to store the data is equal to the amouot of effort and CPU cycles used to get it out.

The failure of curreol relational systems is not in the systems but in the data design. If you won't design relationships into your data op front, then you either have to overpower the bad design with CPU cycles or go out and buy a front-end, multidimensional, object-oriented database reporting system to superimpose the relationships oo yonr messy data.

Charlie Dietz
East Hanover, N.J.

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IS vision 2000: Dancing to the new beat

Patricia B. Seybold

In five years, we'll herald a new millennium. As information technologists, we share a collective vision of how our businesses will be transformed. When we were kids, we were indoctrinated by images of wristwatch walkie-talkies, computers you could converse with and "Beam me up, Scotty." So far, only the latter seems to be eluding our current technological prowess. What can we extrapolate about how information technology will affect us within the next five years? And how do we prepare for that future?

We know our organizations will have fuzzier boundaries. We'll be linked electronically to customers and suppliers. We'll be sharing research and doing product development with business partners and even with competitors. Our customers will shop electronically, browsing on-line malls and submitting requests to electronic brokering services that will supply appropriate alternatives tailored to their needs, tastes and pocketbooks. As the third world comes on-line, new global markets will open up, spawning new sources of innovation and creativity. We'll work from home, from electronic "vacation" homes, planes, trains and automobiles. We'll collaborate electronically with globally dispersed colleagues to develop new concepts, invent new products and propose solutions to complex global problems.

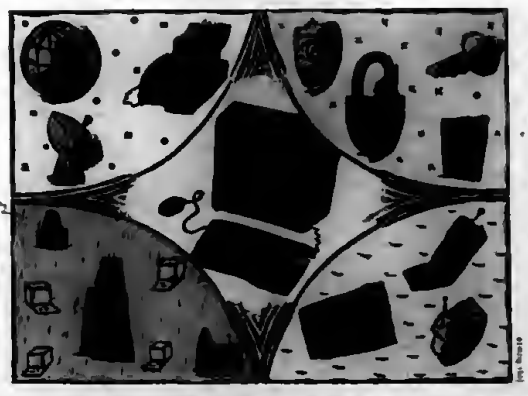
How will we get from where we are today to this brave new interactive world?

Here is the four-step dance I see in our collective future.

Step 1: Mastering personal productivity. We'll use an assortment of information appliances and applications to interact with one another. PCs with more intuitive user interfaces, personal digital assistants, videophones, smart cards, personal game machines, interactive TVs, intelligent watches and some devices we haven't heard of yet. The real trick will be in mastering several of these devices so that they really save us time, not squander it. It is unlikely that a single, integrated appliance will become the de facto standard in the next several years. There are too many different form factors, purposes and markets to satisfy.

What will be required to keep us all from going nuts will be seamless interfaces among multiple appliances. We'll need intelligent agents to coordinate our electronic calendars with our to-do lists, to synchronize our personal Rolodexes with our contact databases and to send and prioritize our electronic communications. We'll need gophers and knowbots to scour the Internet and dig up critical resources. Ours will be a mobile and interconnected workforce. From ditch diggers to social workers, from grape pickers to CEOs, from manufacturing workers to city planners, we'll be reachable by mobile phones, pagers and other devices. We'll need to become masters of peace and quiet, carving out interruption-free time and space for ourselves at home, at the office or on airplanes.

Step 2: Weaving the electronic Web. The global Internet frenzy is a prerequisite step for the next millennium. Companies and countries that are not connected to the Internet will miss out almost entirely on the next global economy. That's why there's such a preoccupation with getting connected. It's like any gold rush. Young men and women are plunging onto the frontier from all parts of the globe: Nigerians, Malaysians, Brazilians, Hungarians, they're all out there — staking their claims, setting up their own roadside attractions. The Internet is the great equalizer. It offers equal access to the



information elite and the previously disenfranchised. It provides a wealth of resources and knowledge — enough to give any smart youngster (or oldster) the keys to the information economy.

It is unlikely that any corporate or government regime, no matter how autocratic, will restrict Internet access for long.

Step 3: Taming the electronic frontier. The Internet and the World-Wide Web provide both the context and the conduit for the next economy. Electronic markets will flourish. Fears of hackers, outlaws, invasion of privacy, security

When we were kids, we were indoctrinated by images of wristwatch walkie-talkies, computers you could converse with and "Beam me up, Scotty."

breaches and instability are well-founded. But like any frontier, the Internet will succumb to civilization and privatization, hopefully without losing too much of its natural spontaneity and creativity. The key missing elements, at this point, are encryption, security and authentication services. These will be offered by a variety of parties (Netscape, Commercenet, America Online, Digital, Microsoft and so on). Making the Internet safe for electronic commerce will be our first priority, and it's a readily attainable goal. Remember, the Internet is a network of networks. Some will be commercial quality networks with adequate security and built-in credit-card authorization and encryption. People who want to play it safe will stick to those better policed highways for business transactions and stray to the scenic routes when they are in the mood for adventure.

Step 4: Designing the interactive enterprise. Now is the time to get your company prepared for the next millennium. By the year 2000, your business will consist of a core knowledge base at the hub, supporting a small set of core business processes. As you transact business with your customers, and they with their customers, the details of those transactions and the qualitative information you glean from your relationships with one another will form the foundation of your corporate knowledge base. Patterns of usage, market trends, cultural preferences and local practices will be captured, analyzed and discussed.

You'll need robust distributed transaction processing applications, so you should be migrating to those new platforms today. You'll also need distributed, replicating data warehouses to support the decision-support and business intelligence applications your stakeholders will want to run against your core data. In addition to accumulating the facts, you'll be accumulating qualitative information, refining the shared mental model of your business.

So begin the design of your qualitative shared knowledge base, using tools such as Lotus' Notes or other document database/conferencing platforms. Link these qualitative and quantitative information bases together and add modeling and simulation tools to enable your employees to plan future strategies based on the changing patterns in your collective knowledge bases.

For capturing and refining business processes, look for business process templates to come on the market in the next couple of years — customer service processes, global manufacturing logistics processes and health event tracking processes. These will be comprised of business objects and business rules that can be easily customized to reflect the changing conditions in your business. These business process templates, customizable business rules and reusable business objects will enable rapid development of distributed applications. So now is the time to codify your business processes and implement them using flexible, easily modifiable technology.

As with any dance, there are lots of variations. But, if you begin your strategy with these four basic elements and weave your own variations around them, you'll be waltzing (or foxtrotting) into the future. Let's listen to the music and boogie on into the next millennium together.

Seybold is president of Patricia Seybold Group in Boston. Her Notes address is Patricia Seybold@PSGCG. Her Internet address is PSeybold@PSGroup.com.

Ease of use on tap for '95 applications

By William Brandel

Componentization, Object Linking and Embedding (OLE). The information superhighway. It's all been hyped in 1994, and some of it may even reach the desktop in 1995.

The bottom line for desktop managers is that by the end of 1995, they can expect applications more suited to making their lives easier. Bells and whistles are out; easy-to-use and network-compatible are in.

The market dictates this change. Desktop applications make up such a large chunk of Microsoft Corp.'s and Lotus Development Corp.'s desktop software sales — and the competition is so heated — that easy-to-use is a better marketing feature than, say, pivot tables.

New technology slated for 1995 will help in this regard. This includes object-ready operating systems such as Microsoft's Windows 95, new versions of IBM's OS/2, as well as the Taligent operating system from IBM, Hewlett-Packard Co. and Apple Computer, Inc.

Changing desktop

Windows 95, the next version of Windows, promises to be the biggest technical factor affecting desktop applications. Already under development, 32-bit suites from Microsoft and WordPerfect, Novell, Inc.'s Applications Group, are promised within 90 days after Windows 95 ships. Lotus has been hazy about the ship date for SmartSuite for Windows 95.

"The exciting stuff is true multithreading," said Jesse Berst, editor of "Windows Watcher," an industry newsletter in Redmond, Wash. When vendors start multithreading all their major functions, "we'll see some great improvements in application functionality," he said.

However, Berst noted that the first round of applications will concentrate on just the basic compatibility with the Windows 95 specification. Included in this will be a different, but new graphical user interface for the operating system and the applications that run on it.

"It includes features that will make Windows 95 easier to use," said Jean Summer, systems coordinator at Barclay's Bank in New York. Summer said she expects this aspect to reduce her training and support costs.

Windows 95 and Component Integration Laboratories' OpenDoc will eventually enable users to build applications out of components. But again, these functions will most likely be merged within the application suites in 1995. For example, Microsoft Office users will use one spell checker for all applications in their suite. Today, Office consists of four applications that use a common user interface and menu system.

Seal of approval

Perhaps the most notable change in applications will arrive late in 1995: Applications will have to support a modicum of OLE 2.0 functions to gain Windows 95 certification. These include drag and drop and OLE automation. Any site capable of writing Microsoft's Visual Basic macros will be able to integrate Windows 95 applications. The same could be expected if any applications that support OpenDoc or Taligent find their way to users.

Applications in 1995 will also have much stronger network connections for both end users and IS managers. In the beginning of the year, Microsoft, Lotus and WordPerfect will deliver hypertext links for their word processing applications. With these, users will have much greater manipulation capabilities over documents that are pulled from the World-Wide Web on the Internet.

Managers get a network perk as well. Windows 95 includes a bevy of new interfaces that will allow network managers to control end users and peripherals on the network. And with Novell and Microsoft each working on Windows 95 requesters, network managers can expect to make those connections as well.

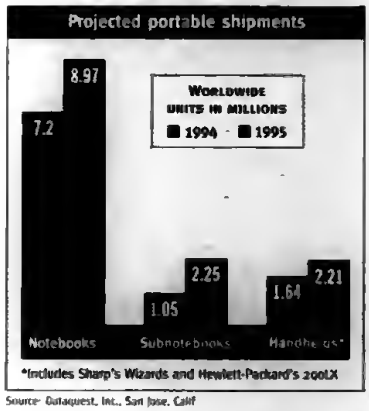
Features fuel notebook market

By Michael Fitzgerald

If the market for portable computers read like a stock chart, losers would outstrip gainers for 1995, prognosticators say.

This bodes well for users. Features are expected to increase while weight and prices decrease.

"There's a lot of hot stuff happening in the high end," said Randal Giusto, a senior analyst at BIS Strategic Decisions in Norwell, Mass. He cited Pentium chips, lithium ion batteries, 800-by-600-pixel displays and screens larger than today's 10.4-in. maximum. Giusto also predicted that notebook pricing "will continue to erode. There will still be $4,000 notebooks, but I don't know if there will be $8,000 notebooks towards the end of 1995." Some high-end models currently cost more than $8,000.



As for weight, "it's idiocy to think subnotebooks will go away," said Kimball Brown, an analyst at Dataquest, Inc. in San Jose, Calif.

This is surprising because generally users were unhappy lightweight subnotebooks in 1994.

Brown said the 1994 variety of subnotebooks suffered from crippled feature sets, including smallish screens, subpar battery life and less-than-full-size keyboards. Recently announced sub-4 pound products such as Hewlett-Packard Co.'s OmniBook 630 and Digital Equipment Corp.'s HighNote Ultra should change that, he said.

"Once you get to an acceptable feature set, everyone wants a lighter notebook," Brown said.

Users say they mostly want more features, and CD-ROM drives were high on the list.

"When you get a notebook with multimedia, the one thing you miss is a CD integrated into it," said Tom Balzarini, PC coordinator at Associated Grocers, Inc. in Seattle. Balzarini said integrated CD-ROM would be helpful for presentations and training.

New year wishes

In addition, Balzarini's wish list includes easy-to-configure PCMCIA slots, on-motherboard 10Base-T connectors, integrated RJ-11 jacks, PCMCIA cellular modems and bigger keyboards all around.

Michael Radigan, program manager at Xerox Corp. in Rochester, N.Y., said he wants built-in speakers and CD-ROM drives. But it seems user wants are outstripping the hardware depreciation cycles.

"I'm looking at all the money we're spending [on notebooks], and now everybody is asking us for capabilities" that do not exist in today's products, Radigan said.

Users look to install Win 95 this year despite ship delay

By Stuart J. Johnston and Ed Scannell

One thing is a given for users in 1995: Windows will expand its dominance and extend into new areas, even though the ship date for Windows 95 has slipped from June to August.

Last week, Microsoft Corp. announced the two-month delay to give it more time to "vigorously" test the software.

When it finally does ship, Windows 95, the next version of Windows, will merge DOS with Windows, eliminating the need for a separate copy of DOS and making Windows a true operating system.

Attribute anticipation

Users are eagerly awaiting features such as 32-bit multitasking, multithreaded execution, longer file names and a new user interface designed to be simpler and more intuitive to use.

Windows 95 is currently in its second beta and has been sent to 48,000 testers, according to Brad Chase, general manager of the company's Personal Operating Systems Group.

Beta testers report that the second beta feels remarkably stable and said they expect to move to Windows 95 fairly quickly. "I think it is going to be a pretty busy year for corporate IS managers with Win 95," said Bill Cornfield, president of the Windows User Support Group in New York. "We expect many of our Fortune 1,000 kinds of users to make a rapid transition over three to six months after its release as third-party applications appear," he said.

There is a silver lining to all this hard work. "One of the big winners should be corporate IS guys who, despite any complaints they might have about [Windows 95], should get bigger budgets to manage the transition over the next two years. It gives them a better look on their jobs," said Jeffrey Tarter, editor of "The Soft Letter" in Watertown, Mass.

IBM rolls out the OS/2 punches

Users wonder how it will fare against Microsoft's Windows 95

By Ed Scannell

■ It has always been a matter of control in the desktop operating systems wars. Microsoft Corp. has always had it, and IBM has always wanted it.

With delivery of the long-overdue 4M-byte version of OS/2 in November, IBM officials said they believed they had gained back some measure of control from Microsoft. The product performed reasonably well on most typical corporate desktop machines and represented the cornerstone for several versions of products due in 1995.

But as the year closed, Microsoft delivered a features-complete beta version of Windows 95, the next version of Windows, and many corporate users appeared reasonably impressed with it. With industry analysts predicting Microsoft will sell anywhere from 20 million to 40 million copies in 12 months beginning mid-1995, many users said IBM's desktop control goals will remain elusive.

Stiff competition

"IBM's success in 1995 really depends more on what Microsoft does [with Windows 95] than anything IBM can do. To my mind, IBM is no longer in control of its fate," said Bob Evans, a senior technical consultant at Nevada Power Co. in Reno, Nev.

"Maybe the best thing OS/2 will end up doing next year is forcing Microsoft to produce a better Windows 95 and to lower the price of it to OEMs and users. That would benefit the entire industry. But IBM can't afford to be a philanthropist these days," said Dave Landis, a PC coordinator at Consolidated Edison Co. in New York.

If OS/2 fails to take over the desktop, it will not be for a lack of trying on IBM's part. The company is scheduled to release at least four different versions of OS/2 in the first half of 1995 alone — including the Full Pack version of OS/2 Warp, the LAN Client, OS/2 for the PowerPC and OS/2 Server.

An OS/2 version that includes several of the more advanced features borrowed from Taligent, Inc.'s object-oriented operating system may also make an appearance in the first half of 1995. But that may depend on whether Taligent continues to make reasonable progress.

A fighting chance

But despite users' lack of optimism about IBM's chances against Microsoft, most still said that IBM has a good desktop and client/server strategy if all the promised pieces are delivered on time.

"I like what I see coming, with Warp on the desktop and the OS/2/LAN Server [4.0] combination. It looks like a solid client/server strategy at the departmental level," said Don Strock, a LAN administrator at Dow-Corning, Inc.

"Personally, I am impressed with how hard IBM is trying to make its strategy work for 1995. If they had done this a few years ago, they would have [had] a much better chance. But it is really hard for me now to see that this will take," said Paul Grayson, chairman of Micrografx, Inc., a company that has delivered both Windows and OS/2 applications.

If it is ever to vault OS/2 out of its niche status, IBM must sign many more bundling deals such as the ones it signed with Vobis Microcomputer AG and Escom, Germany's largest PC suppliers.

But to land those two deals, IBM gave the two companies overly generous licensing terms to bundle OS/2 on their systems and will make almost no profit, according to sources familiar with the deal. While such deals could result in IBM selling as many as 5 million copies of OS/2 in 1995, financially the company would only break even at best.

Plans call for the third beta test to be complete in June. From the time the code goes "gold" — that is, is signed off as finished — it will take roughly 45 days to manufacture several million copies and ship them to outlets, and for PC manufacturers to install Windows 95 on new machines and ship those to the distribution channel, said Microsoft Chairman and Chief Executive Officer Bill Gates.

Making the big time

Microsoft's projection of how many units of Windows 95 it will sell in the first 12 months after its release has varied from 50 million in December 1993 to 30 million in mid-1994. Analysts predict Windows 95 will quickly become the best selling operating system in history.

On the desktop, that leaves little room for IBM's competing OS/2 Warp to gain much headway (see story above). This is especially true given Windows NT's progress in areas such as workstations and servers.

After a slow first year, when Microsoft sold only about a half-million Windows NT copies, sales took off with the release of NT Version 3.5 in October 1994.

Interest in Windows NT has, in part, been sparked by a family of server products that Microsoft has begun offering on NT Server, including SQL Server, Mail Server, SNA Server and the Systems Management Server. A radical update of Mail Server, called the Microsoft Exchange Server, is due in 1995.

Microsoft has also gone out of its way to convince third-party Unix software houses to port their products to NT.

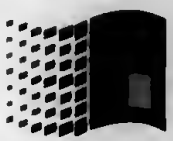
During 1995, Microsoft will target IBM AS/400 minicomputer users with a new version of SQL Server, called SQL Server 95, said Roger Heinen, senior vice president of Microsoft's Developer Division.

But do not look for the next major update of NT in 1995. That update, code-named Cairo, has been postponed until 1996, said Jim Allchin, senior vice president of the Business Systems Division. Cairo will provide a new object-oriented file system, network support for the company's Object Linking and Embedding technology and a superset of Windows 95's new user interface.

Because Cairo has been delayed, the company is mulling over whether there is a way to ship a new Windows 95-compatible interface for NT. But Allchin said that is unlikely.

Windows 95: Countdown to a desktop explosion

- **March 1993:** Microsoft announces that its next Windows version, originally code-named Chicago, will not need DOS.
- **August 1993:** First alpha code of Chicago goes to testers and developers.
- **June 1994-July 1994:** First beta, "M6," goes to early beta testers.
- **September 1994:** Microsoft renames Chicago as Windows 95.
- **October 1994-November 1994:** Second beta, "M7," goes to 48,000 testers.
- **December 1994:** Microsoft announces it may push Windows 95 ship date from June to August.
- **March 1995:** Third beta, "M8," the Preview Program, will go to as many as 400,000 testers.
- **May 1995-June 1995:** Beta test will end, and final code will go to manufacturing.
- **August 1995:** Windows 95 scheduled for release.



Microsoft Windows 95

Microsoft acknowledged it would need another couple of months to properly test the operating system to ensure it more smoothly installs and configures with a wider range of hardware and software. Company officials claimed the additional time would not be spent repairing major bugs or adding any new features.

[redacted]

Spalding Software, Inc. has announced DataImport 4.0 for Windows, data translation software.

According to the Norcross, Ga., company, DataImport 4.0 lets users access data from PC, midrange and mainframe applications, regardless of file format.

The product translates data into native formats of popular PC spreadsheet and database applications. Features include the capability to unstack multiline detail items on screen and extract specific sections of a report.

DataImport 4.0 costs $189.

▶ *Spalding Software*
(404) 449-1634

Tektronix, Inc. has announced the Phaser 540, a color laser printer.

According to the Wilsonville, Ore., company, the Phaser 540 produces continuous-tone color for photographic-quality images and print-on-demand speeds.

The printer prints four full-color pages per minute and 14 monochrome pages per minute. Automatic port and protocol switching lets Macintoshes, PCs and Unix workstations use the Phaser 540.

The Phaser 540 costs $8,995.

▶ *Tektronix*
(503) 682-7377

Canon Computer Systems, Inc. has announced the IX-3010, a gray scale, flatbed scanner.

According to the Costa Mesa, Calif., company, the IX-3010 provides 300 by 1,200 dot/in. resolution and can capture an image in 10 seconds.

The product includes Caere Corp.'s Omniscan Plus scanning software and PageKeeper Portfolio software, which manages paper and electronic files.

Users can scan documents and convert them into text that can be edited from within their favorite word processor, spreadsheet and desktop publishing applications.

The IX-3010 costs $569.

▶ *Canon Computer Systems*
(714) 438-3000

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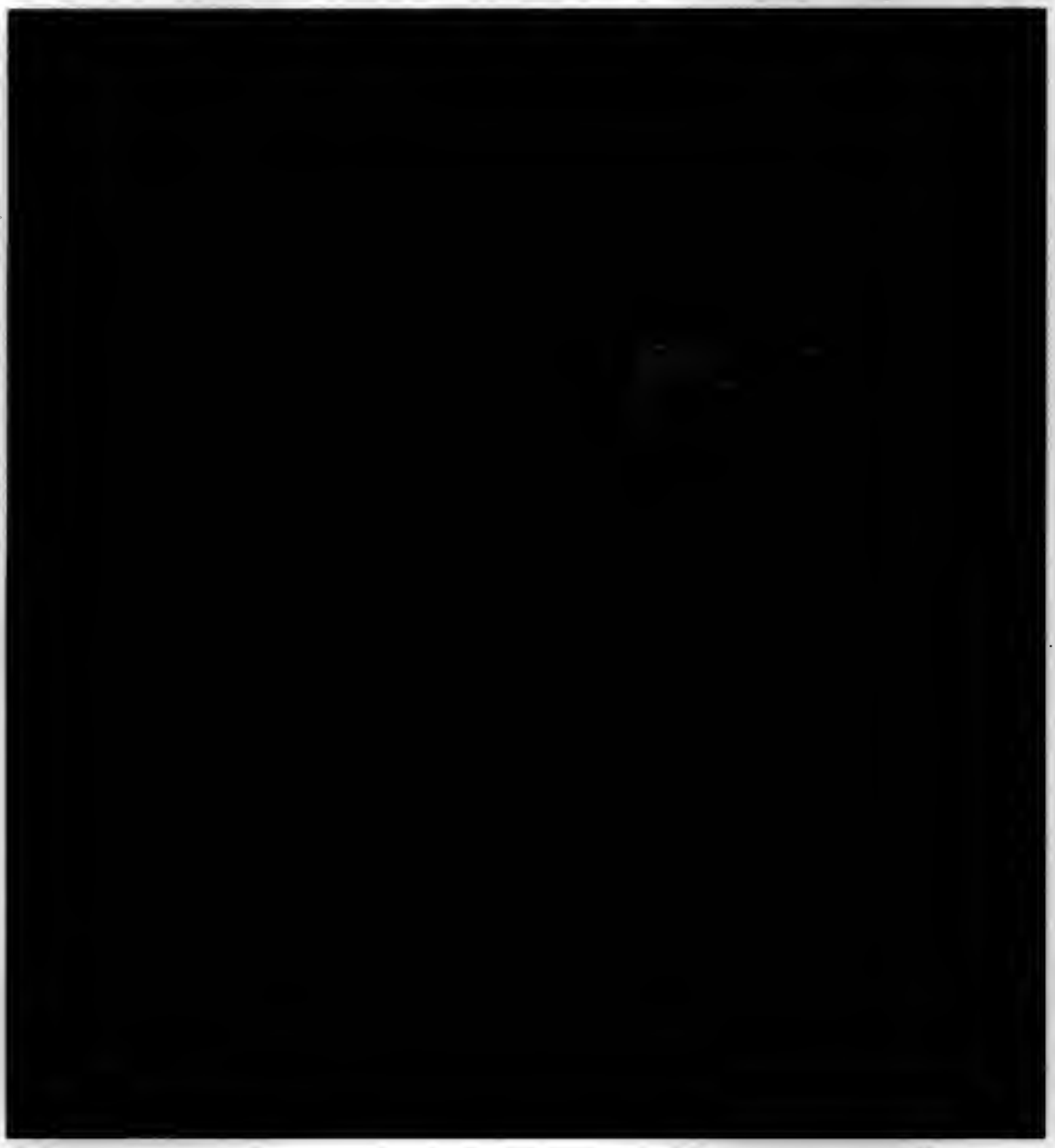

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More strong PC growth expected for 1995

By Jaikumar Vijayan

Buoyed by strong demand for desktop multimedia systems and notebook computers and by rapidly improving price/performance, the U.S. PC market continues to surge. PC unit shipments topped 20% growth for a third year, according to figures from International Data Corp. (IDC) in Framingham, Mass.

The same factors are expected to result in a strong performance for 1995, with expected market growth of 15% to 20%, IDC predicted.

"The PC market has been turned on its head, with the consumer market leading the way," said Richard Zwetchkenbaum, an analyst at IDC.

As a result of this growth, there has been a greater vendor focus on ergonomics, ease of installation, serviceability and the integration of CD-ROMs in more business systems, according to Zwetchkenbaum.

According to the report, strong growth in the PC market is also due to the following:

- More retailers stocking computers.
- Wider consumer acceptance of the PC.
- The rapid pace at which older-model PCs are being replaced.
- A cessation of the consolidation among the bottom tier of vendors that was rampant in 1993.

IDC predicts that PC shipments will hit 18.4 million by the close of 1994. That figure is up 23%, from 14.95 million in 1993. The IDC data is based on three quarters of actual results and a forecast for the fourth quarter of 1994.

Compaq cruises

Market leader Compaq is projected to ship an estimated 2.36 million units in 1994, followed by Apple with 2.22 million and Packard Bell with 2 million. IBM trails in fourth place with 1.87 million. Rounding out the Top 10 vendors in terms of unit shipments in the U.S. market are Gateway 2000, Inc., Dell Computer Corp., AST Research, Inc., Toshiba, HP and AT&T GIS.

And the winner is...

Closing out the year, Compaq Computer Corp. will top the PC market with a projected 12.8% market share, followed by Apple Computer, Inc. at 12.2% and Packard Bell Electronics, Inc. with a 10.8% share. Former market leader IBM will finish fourth with a 10.2% share.

According to the report, 1994 seems to have been a particularly good year for companies such as Hewlett-Packard Co., Toshiba America Information Systems, Inc., Packard Bell, Acer America, Inc. and AT&T Global Information Solutions, all of which had growth rates in excess of 85% in the past year.

Packard Bell and Acer seem to have benefited primarily from the retail boom in multimedia systems, the report said. Product revamps and a general broadening of their offerings may have helped HP and AT&T GIS have a good year, too, while Toshiba has staged an impressive comeback in the notebook market, where it wrested the No. 1 slot from Compaq, according to IDC.

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Brief

SunSoft adds to SolarNet

SunSoft, Inc. said last week it is adding PC-X Window System software to its SolarNet PC administration software for Unix servers. This will allow PC users to access those Unix servers through a point-and-click interface. Pricing starts at $345 per user.

NetWare, NT Server to divide lion's share

By Laurs DiDio

■ The network operating system arena looks like a two-horse race in 1995, with Novell, Inc.'s NetWare 4.1 and Microsoft Corp.'s Windows NT Server 3.5 locked in a battle for first place in new installations.

IBM's LAN Server 4.0, which has quietly garnered oew accouot victories among IBM's installed base of mainframe shops, will put in u strong third-place showiog, good for about 10% market share, according to industry analysts.

The rest of the field — including Banyan Systems, Inc.'s Vines and the all-but-dead Hewlett-Packard Co. LAN Manager — will be strictly relegated to also-ran status io the year ahead, analysts said.

The current champion, NetWare, with an iostalled base of 3 millioo users and close to 70% market share, is many lengths ahead — for aow. But challeoger NT Server 3.5 has iots of marketing momentum. Users and analysts say they expect it lo make up ground quickly at NetWare 4.1's expeose.

"Novell has to jump-start its NetWare 4.1 revenue starting io tbe first calendar quarter," said Steve Schatt, ao analyst at Computer Iotelligence InfoCorp in La Jolla, Calif.

Hard to resist

Historically, ead users have beeo reluctant to switch horses in midstream. Bot thut may oot be the case with NT Server 3.5. While there is hardly a stampede, after several mooths of beta-testing the operating system, u few users said they will phase out NetWare in fuvor of NT Server in the coming months.

One such user is Randy Dugger, associate informatioo systems director at Liposome Technology, Inc., u pharmaceutical company in Menlo Park, Calif.

"NT Server 3.5 doeso't come with u red Ferrari, but other than that it's been great and has all the features and functionality f want," Dugger said. "It's proved so stable io our production networks over the past four mooths thut we've decided to phase out NetWare."

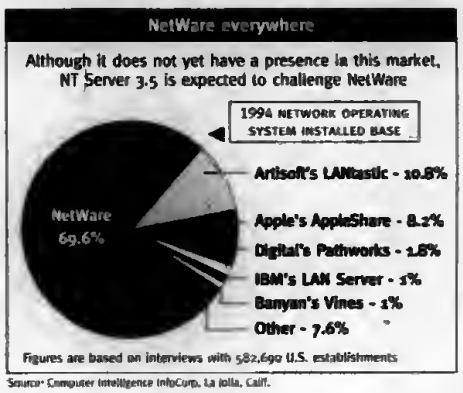
Steve Sommer, director of MIS at New York law firm Hoghes Hubbard & Reed, said Microsoft is marketing NT Server harder and doing more to win his busioess than Novell is.

"Microsoft has let me give them more inpot on features and functionality for NT Server 3.5 than Novell did with NetWare 4.1," Sommer said. "Novell hasn't done anything to fight to keep my business. I'm switchiog to NT Server 3.5."

Even stalwart NetWare devotees, such as Ed Wilk, oetwork manager at WHDH-TV in Bostoo, acknowledge being both worried and influenced by the ubiquitous Microsoft marketing juggernaut.

"I'm not fully convinced of the merits of NT Server, but I can't ignore it," Wilk said. "Microsoft's influence is so pervasive, it'u scary. The company wants to sell me everything from keyboards to checking accouot software."

Clearly, no one expects the installed base of NetWare users to ride off into the sunset and into NT Server's waitiog arms, said Bob Sakakeeny, an analyst at Aberdeen Group io Boston. "But Novell has angered its customer base by lagging behiad on delivering NetWare 4.1. When a company does that, there'u backlash," Sakakeeny said.



Pentium clones line up

Intel looks to sixth generation, but P6-based systems unlikely before '96

By Jaikumar Vijayan

1995 could well be the year of the fifth-geoeration x86 microprocessor.

As Iotel Corp. iotensifies its efforts to move the market to Peotium and as rivals such as Advanced Micro Devices, Ine. and Cyrix Corp. begin volume production of Pentium-class products by mid- to lute 1995, market attentioo will become firmly focused oo 586-class chips, analysts said.

NexGen, Inc., the other Peotium-clone manufacturer, is already shipping chips in volume, and low-cost systems based oo its processors should become widely available oext year.

Still, 486-based systems should account for approximately 50% of the market in 1995, with Cyrix and AMD picking up where Intel leaves off, said Jenoifer Munsoo, an analyst at WorkGroup Technologies, Inc. in Hampton, N.H.

"The 486 is a very osefut chip for u lot of corporate applications. It's going to be around for a few more years," she said.

Iotel hopes to pull uway from the pack by announcing its sixth-generation P6 processor. The chip is rumored to have patented technology that will make it difficult for other vendors to clooe. But systems based on the processor are oot expected to hit the market until well into 1996 and are unlikely lo have much market inpact on other processors for at least another couple of years, analysts said.

At the same time, "Intel will start losing some market share next year" as enstomers look at emerging high-performance chip alternatives, Munson said.

For instance, desktop boxes based on PowerPC chips should become available from IBM in mid-1995. The loog-awaited PowerPC 615 chip, which will run DOS aod Windows applications in emulation, should also be available by then and could spur demand for PowerPC platforms among current Intel users, according to anulysts. Meanwhile, higher-speed chips such as the 133-MHz PowerPC 620 should start shipping by mid-1995.

Other RISC chip makers will also begin to make available a wide variety of chip alternatives aimed mainly at the server and multiprocessing markets.

Digital Equipment Corp.'s Alpha AXP 21164, which boasts three times the integer performance and six times the floating-point performance of Intel's 100-MHz processor, will be aimed at the database, departmental and workgroup server markets.

Mips Technologies, Inc.'s Windows NT-optimized R4400 and R1000 processors will target those markets as well.

Vendor/chip	Availability	Clock speed	Features	Description
Intel/P6	Third-quarter 1995	250 to 300 MHz	6 million transistors, 256K-byte L2 cache	Will hold more transistors than current Pentium processors. Aimed at high-end PC and multiprocessing applications.
IBM/Motorola/ PowerPC 620	Mid-1995	133 MHz	64-bit superscalar RISC	Aimed mainly at the high-end symmetrical multiprocessing environment.
AMD/K5	Volume shipments in mid-1995	Matches current Pentium processors	0.5 micron, 4 million transistors, superscalar RISC	30% higher sustained performance than Pentium running at equivalent clock speeds.
Digital/ Alpha AXP 21164	Volume shipments in January for 266-MHz version and March for 300-MHz version	266 and 300 MHz	0.5 micron, 64-bit CMOS RISC	The fastest processor available, with performance in excess of 1 billion instructions per second.
Cyrix/M1	Sampling now; volume shipments in first-quarter 1995	50 MHz and faster	0.5 micron, 586 RISC-class	Manufactured by IBM. Matches current Pentium performance.
Mips Technologies/ VR10000	Volume shipments in second half of 1995	300 MHz	0.35 micron, 2 million transistors, 64-bit RISC	Aimed largely at database and application servers.
NexGen/ Nx586	Shipping now	The equivalent of 75-, 90- and 100-MHz Pentium chips	0.5 micron, 64-bit buses	First Pentium-class clone to ship. More than 50 vendors have signed up with NexGen.

Workflow, imaging go mainstream

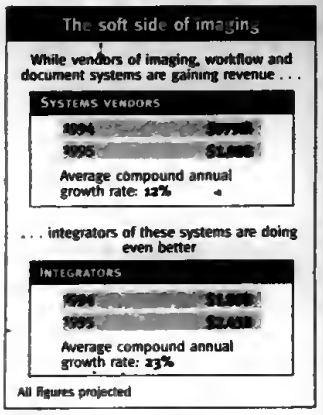
By Mary Brandel

The workflow market is expected to explode this year as new entrants — including operating system vendors — jockey for position.

Meanwhile, imaging will usher out smaller players as it settles more comfortably into existing, rather than specialized, business environments.

Much of the workflow growth will come from users adding to their current imaging systems. This means repeat business for the likes of IBM, FileNet Corp. and Wang Laboratories, Inc., said Jennifer Mitchell, an analyst at Dataquest, Inc. in San Jose, Calif.

But many other players will also seek the mantle of workflow vendor. "At some point, this category of product may turn out to be a general productivity tool for white-collar workers, like the word processor," Mitchell said, and everybody wants a piece of the pie.



Source: Dataquest, Inc., San Jose, Calif

Users need to make sure they purchase applications that are compatible with the document-management plans of Apple Computer, Inc., Microsoft Corp., IBM and Novell, Inc.

Workflow systems will become more appealing due to their ability to work with database records, electronic-mail messages and text documents, said Carl Frappaolo, executive vice president at Delphi Group, a consultancy in Boston. Also, "users have been screaming for simulation and modeling tools," he said. Vendors will start to respond in 1995.

Altered image

Imaging will continue to wend its way into existing business applications and environments. In fact, images "are becoming less a technology [and] more a data type," Frappaolo said. "It will become an expected feature in databases and text systems."

In addition, both workflow and imaging systems will continue to link up with popular development environments such as Powersoft Corp.'s PowerBuilder and Microsoft's Visual Basic. Wang is currently leading this effort.

"That's the key to why we're implementing imaging into our current applications rather than buying a complete turnkey system from a VAR," said Kelly Fansler, senior programmer/analyst at Watkins Motor Lines, Inc. in Lakeland, Fla. "You can tie in images directly with the data."

"The predominant approach today is proprietary," Frappaolo said. But more people are asking, "Why can't we just use what's out there?" he said.

Two late 1994 events will bear out that trend: The opening of Lotus Development Corp.'s LN:DI to imaging servers from Wang, FileNet and ViewStar Corp. and built-in imaging services in Novell's NetWare 4.1.

Low prices on desktop imaging systems may also help ease the technology into corporations. But "cost is still the highest barrier when evaluating systems," said Bob Larrivee, an analyst at BIS Strategic Decisions in Norwell, Mass.

Costs exist mainly in services (see chart). Integrators, Mitchell said, are seeing 100% growth in imaging contracts signed. Specialized hardware, such as production-capable scanners and optical jukeboxes for hundreds of gigabytes of data, also adds to the price, she said.

A smart way to spe

User preference pushes Unix, Windows closer together

Need for diversity fuels connectivity at both ends

By Jean S. Bozman

The open systems world is drifting toward greater connectivity among Unix servers and Microsoft Corp. Windows clients and Windows NT servers. The pull is coming from users who already have hundreds or thousands of Windows PCs surrounding a relative handful of Unix servers.

Meanwhile, sales of Unix systems remain strong, growing fastest on the high-end platforms that run corporate databases, industry analysts said.

The Alberta Cancer Board typifies this trend. Felix Fridman, director of information systems, is starting a LAN at corporate headquarters based on Microsoft's Windows NT servers and Windows for Workgroups groupware. But Fridman's 500-user organization runs all its mission-critical applications on 15 Sun Microsystems, Inc. servers and about 80 Sun workstations.

"We're hoping for more Windows connectivity," said Fridman, who relies on a TCP/IP network and Suo's PC-NFS software to tie Windows clients to Unix servers. "We feel comfortable with diversity on the client side."

Fridman is also interested in Sun's planned release next year of the OpenStep object-oriented application development framework and in setting up some Next Computer, Inc. NextStep or OpenStep clients on the desktop.

Year of choice

Industry analysts at International Data Corp. (IDC) predict the overall workstation market will see 30% growth in 1995, including Windows NT machines. Unix workstations on their own will grow by roughly 15%, said Laura Segervall, manager of workstation research at IDC in Mountain View, Calif. In 1994, about 895,000 workstations were sold worldwide, she said.

Analysts also expect considerable crossover between high-end PCs, led by those based on Intel Corp.'s Pentium, and low-end Unix workstations from IBM, Hewlett-Packard Co. and Sun.

"I think we could probably lay the distinction to rest by the end of the year," said Michael Goulde, a senior consultant at Patricia Seybold Group in Boston. "In 1995, you'll have your choice of multiprocessor Intel desktops and RISC desktops, with the same operating systems on many different platforms."

Many players

High-end Unix servers, the fastest-growing segment of the Unix market, include IBM's SP/2; Digital's Advantage clusters; Cray Research, Inc.'s T3Ds based on Digital's Alpha chips and Superserver CS 6400s based on Sun's SPARC chips; and Convex, Inc.'s Exemplar servers based on HP PA-RISC chips.

This will allow users to pick and choose applications without having to swap out hardware to accommodate them. Sun workstations, for example, run the Solaris operating system on Intel chips; a Solaris version to run on PowerPC will be ready next year. Similarly, Windows NT runs on PowerPC and Digital Equipment Corp.'s Alpha chips. Some believe Intel's Pentium problems may boost unit sales of RISC-based PCs.

Unix server growth will continue to be very strong in the midrange and high-end segments of the market, according to longtime Unix-watcher Terry Bennett, an independent analyst in Beaverton, Ore. Already strong as corporate database servers, Unix symmetrical multiprocessing servers will become more powerful with the advent of 64-bit chips and 64-bit operating systems in 1995.

"It's one of the fastest-growing segments in the computer industry — about 30%," Bennett said.

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Client/server messaging: Don't hold your breath

By Suruchi Mohan

For most users, 1995 will be the year for watching and waiting for client/server messaging products to surface. The move to these products will not occur until 1996, most industry pundits agreed.

For their part, vendors, including Lotus Development Corp., Microsoft Corp. and Novell, Inc., are planning to introduce their client/server messaging products in 1995, although some products may slip into 1996. Meanwhile, most users are staying put.

"We will see a lot of confusion from customers who don't understand client/server [messaging] or how to migrate," said David Marshak, vice president and senior consultant at the Patricia Seybold Group in Bostnn. "But we won't see any actual movement nntil 1996."

Judy Rosall, program manager at International Data Corp. in Mountain View, Calif., agreed. "Ie 1995 the year? I don't think so," ahe said. The movement to client/server messaging will not happen nntil 1996, she predicted.

E MAIL

Mail mania

According to a survey of 2,000 large companies by the Electronic Messaging Association in Arlington, Va., there were 180,000 E-mail sites in 1993. The survey forecasted that the number of E-mail sites would increase to 250,000 from 1994 to 1995. The number of E-mail users worldwide in 1994 is between 40 million and 50 million, and it could reach 60 million by the end of 1995, the association said.

Shakeout scenario

In other ways, 1995 will be the transition year that will see a ehakeout in the industry, perhaps leading to a more stable 1996. Sara Radicati, president of The Radicati Group in Palo Alto, Calif., eaid ebe expects to see "a lot more mergers and acquisittons." In 1994, small companies were buying emall companies; in 1995, big companies will buy big companies, ahe predicted.

Further, she added, the messaging scenario in 1995 will be completely different from that of 1994 — the players will be different. "We'll bave new top players [who] we don't [even] think about today," Radicati said.

Some of these new players may be in areas that are only now gaining ground, such as X.500 directory services and electronic-mail management, according to analysts.

Lotus' announcement in December of Ite implementation plans for X.500 may set tbe ball rolling toward widespread adoption of directory services. However, given the lag time between when products become available and their implementation, there may not be much movement before 1996. Indeed, Marshak said he thinks the X.500 market may not be in much better shape, but "[we] may know better where we are going."

Messaging management has been an issue for some time, and 1995 may see more new products on the market. According to Rosall, management will be one of the core pieces for people'e selection of a messaging system.

Connection lost?

Overall, Marshak said, by the end of 1995 users will achieve virtually ubiquitous connectivity. This will lead to frustration, too, because of the quality of the connectivity.

For example, users will wonder if all kinds of file attachments will work over all kinds of connections. Also, connectivity will bring in its wake viruses and security breaches — and as a result, some backlash against wide-open use of mail. This may lead companies to put reetrictions nn external mail sourees.

If this happens, this will be a second instance of a move toward conservatism. Just recently, plug-and-play messaging components from different vendors were all the craze. This led to the move, once again, toward going for a solution from one vendor — reminiscent of the days of the mainframe. Messaging connectivity may indeed come full circle in 1995.

Experts probe threats, defenses to 'net security

By Gary H. Anthes

An electronic poll of security experts on the Internet brought these replies. (Answers edited for length; participants listed below.)

CW: What new or increased security threats might we see in 1995?

Michael Paris: Virus writers are running beta copies of Microsoft's Windows 95 so they can be ready to cause trouble for the new users. Virus writing has been slow this year, but those I talk to have said most of their time is being spent learning and practicing for Windows 95.

Donn Parker: Theft of small computers will reach epidemic proppртions requiring jewelry security methods. Also look for automated hacking, where entire crimes, including conversion to gain, will be automated. This will require automated detection, mitigation and retaliation to deal with electronic speeds of these crimes.

There will be LANarchy, where knowledge of equipment and interconnectivity in large organizations is lost. You can't make something secure unless you know you have it.

There will also be information anarchy because those who encrypt information in an organization may not be those who have accountability for it. You need control over key and device management by higher management.

William Murray: Special [hacking] knowledge is getting encapsulated into computer programs. All you have to do to get a [password sniffer] is broadcast onto the Internet and you get an answer back. Hackers aren't getting any smarter; their work is just getting easier and easier.

John Linn: Given the growing availability of resources sold across on-line services and on the Internet, I'd expect to see growth of impersonation attacks [such as credit-card fraud].

B. Clifford Neuman: We are likely to see much greater incidence of network monitoring attacks, where attackers listen to the network looking for passwords and other important data. Payment services are starting to appear on the network, and attacks on weaker systems will be lucrative.

J. E. O'Neil: "Social engineers" will perform cons in order to get log-in/passwords, credit-card information, calling-card information and other personal information from unsuspecting victims.

Under the auspices of competitive advantage, companies will increase their espionage activities. Foreign governments will continue to infiltrate U.S. business in order to reduce their research and development expense.

SRI International's Donn Parker *predicts that small-computer theft will reach 'epidemic proportions' in 1995*

Ken Cutler: The dramatic growth in Internet usage means more people will come under attack. If the [company] downsizing trend continues, that will continue to create concems about disgruntled employees.

CW: What new defense measures are we likely to see ie 1995?

O'Neil: There will be an increase in the use of token-based authentication for dial-in access to organizational systems. These tokens will make it more difficult for unauthorized users, both hackers and insiders, to access systems they should not be accessing. Encryption use will greatly increase.

Security, *page 82*

Information security experts polled by Computerworld

Ken Cutler, vice president and director, Information Security Institute, a divisioo of MIS Training Institute, Woodbridge, Va.
Dorothy Denning, computer science professor, Georgetown University, Washington
John Linn, principal architect, OpenVision Technologies, Inc., Cambridge, Mass.
William Murray, information security consultant to Deloitte & Touche
B. Clifford Neuman, assistant professor, University of Southern California, Information Sciences Institute, Marina del Rey, Calif.
J. E. O'Neil, Information security manager, Pacific Bell
Michael Paris, president, Computer Research & Information Service, Cicero, Ill.
Donn Parker, senior consultant for information security at SRI International, Menlo Park, Calif.

Time to sort out network options

By Stephen P. Klett Jr.

For vendors and users alike, 1994 was a turbulebt year for internetworking. While t995 should bring ao new technology, keep those seat belts fastened because the hnmpy ride will continue.

During the past year, users have been haffeted with a plethora of Ethernet, Token Ring and Asynchronous Transfer Mode (ATM) switching products covering workgroup and enterprise apphcations.

While these prodncts should provide relief to bandwidth-strapped aetworks, they are also creating confusion in the short term.

"I'm hoping that some of the [fear, uncertainty and donbt] issues in the high-speed LAN area will resolve themselves," said Kathryn Korosloff, president of Sage Research, Inc. in Natick, Mass. "A lot of people are waiting to see what the Joneses do before they make any decisions."

In the meantime, switching has spurred furious consolidation (see story, page 58). Some of the largest examples include the blockbuster merger of Wellfleet Communications, inc. and SynOptics Communications, Inc. to form Bay Networks, Inc.; and more recently, Cisco Systems, inc.'s acquisition of Kalpana, Inc. and Light Stream Corp.

Then there is the issue of speed.

Two competing proposals for 100M bit/sec., or "fast," Ethernet — 100Base-T and t00VG AnyLan — are expected to be ratified by the Institute of Electrical and Electronics Engineers, Inc. as standards next month. A bevy of products supporting each technology are slated to appear in the first quarter from companies such as 3Com Corp. and Hewlett-Packard Co.

However, analysts expect products that combiae switched legacy LAN technology with high-speed links for servers — such as 3Com'a LanPlex 2000 and UB Networks, inc.'s GeoRim hubs — to be the hot ticketa next year.

Many implementations of 25M hit/sec. ATM eame on strong toward the end of the year due to broader vendor anpport and the ATM25 Desktop Alliance. A recent ATM Forum vote in Japan has cleared the way for the technology to be recoasidered as standards, which would result in two competing low-speed ATM standards: 25M and 51M hit/sec.

In addition, a LAN Emulation standard for transporting legacy LAN traffic over ATM is expected to be ratified by the ATM Forum in January, which should make ATM a serious contender for user mind share in the second half of 1995, analysts said.

Plans for ATM

"ATM is obviously something we're watching very closely and is something we want to do," said Jerry Magginnis, director of telecommunications at McCann-Erickson Worldwide in Louisville, Ky. "My vendors better be ready for ATM in '95 because I am, and if they're not, I won't heaitate to change them."

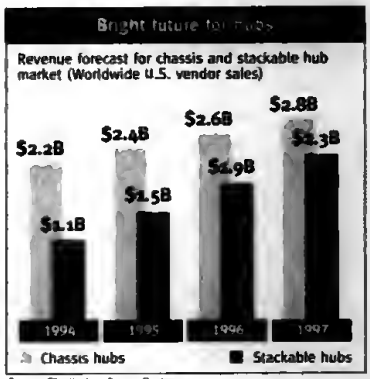
Most vendors are scrambling to heed this call. For example, Bay Networks and Cabletron Systems, inc. are each expected to roll ont LAN and ATM switching products for their respective enterprise hnh platforma in the first quarter.

Bay Networks will unveil LAN switching modules for its System 5000 hnh followed hy an ATM core-switching engine for the 5000 in the second quarter. Bay Networks' much hallyhooed and much delayed LattisCell 28000 "fast" Ethernet switching hnh is also expected to ship in the first quarter. Chip problems kept the 28000 from meeting its third-quarter 1994 ship date.

Cabletron, meanwhile, will unveil LAN and ATM switching modules based on its Secure Fast Packet Switching technology, which it announced last January.

This is good news for some users.

"We've run into some congestion and are starting to look at and evaluate LAN switching as a possible fix — with ATM cell switching being the light at the end of the tunnel," said Chris Steele, telecommunications specialist at Chrysler Corp. in Center Line, Mich.



Source: The Yankee Group, Boston

Be patient with wireless waiting game

Transition could take most of 1995, but most pieces will fall into place

By Michael Fitzgerald

■ After a sobering 1994, those who want wireless data will need to be patient in 1995.

While the wireless market continues to have bright promise, the technology is taking longer to roll out than perhaps anyone expected at the start of 1994.

Equipment delays have plagued deployment of a Cellular Digital Packet Data (CDPD) network, and usability and geographic coverage issues have challenged existing wireless data networks from Ardis Co and RAM Mobile Data USA L.P.

Further, vendors are just now figuring out that they must sell wireless networks differently than they sell land line networks.

All this means that 1995 will likely be a year of transition for the wireless world.

"The promises made in '94 will appear in '96 Yoo just have to get through '95," said Iain Gillott, an aaalyst at Link Resources Corp. in Framingham, Mass.

Analysts say they expect to see a number of developments in 1995, including the following:

- A proliferation of wireless modems, which should reduce costs of these pricey peripherals.
- Increased software development, which should make wireless applications easier for corporate users to apply.
- Continued standards development so users do not have to pick and choose between the varioos wireless data networks.
- Increased network presence, in the form of narrowband personal communications services, which will create sophisticated paging networks that can be used for a variety of limited data purposes.

"It's going to be easier than it's ever been to use wireless in 1995, hut it's still not going to be a slam-dunk" technology, said Andrew M. Seybold, editor of the "Outlook on Communications and Computing," a aewsletter in Brookdale, Calif. Seybold said corporate users should apply common sense when thinking about wireless applications in 1995.

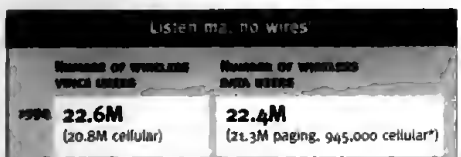
"If you can prove that it works for you and it saves you time and effort and money, you should use il," he said.

Seybold compared wireless data with using a modem to transmit files from a hotel room in 1990. "You can do it, but it'a not something that's uhiquitooa," he said.

CDPD exposure

Users, particularly those waiting for CDPD to develop, should begin lo get a taste of what it will do for them.

"The rollout [of CDPD] is somewhat slower than everyone had hoped. . . But we intend in some geographic areas to be able to deploy it on a mission-critical basis," said Sheldon Laube, national director of information and technology at Price Waterhouse. Laube said the allure of wireless data "is just tike cellular phones. I mean, you don't have to find the phone line" to use it.



Source: Link Resources Corp., Framingham, Mass.

Security

CONTINUED FROM PAGE 81

Linn: We've started to see the availability of technologies for authentication, integrity and confidentiality. In 1995 we will see more applications building them in.

Cutler: We'll see better security interoperability as a result of continuing improvements in OSF/DCE security. There may also be better security features in database packages.

Neumaa: We will see greater use of onetime passwords and integration of onetime password mechanisms with cryptographic authenlication systems such as Kerberos. We will see widespread use of public key cryptography for privacy of communication to service providers.

Consultant William Murray: *Hackers' work getting easier*

Dorothy Denning: I expect lo see continuing developments in firewalls, intrusion detection systems, cryptography — including use of PCMCIA cards both for secrecy and authentication — and antiviral protection. It will, also get easier to use onetime passwords and challenge-response protocols. We will also see new approaches to key-escrow encryption, especially commercial key escrow.

Murray: New tools for authentication, confidentiality and integrity are being used. More than half of the Fortune 500 companies use onetime passwords. Unfortunately, the total use of compulers in lhose firms is growing much faster than the application of the onetime passwords.

IBM big iron revamps bode well for '95

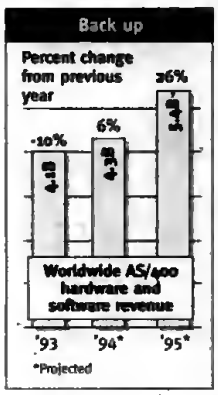
Client/server OS, 64-bit architecture await AS/400

By Craig Stedman

IBM has spent the past few years trying to answer questions about the AS/400's place in a client/server world. In 1995, users will start to find out whether the computer giant got it right.

A client/server-oriented rewrite of the OS/400 operating system is supposed to be fully in place by February, following a three-month delay on some pieces of software [CW, Nov. 28]. The other shoe will drop in the second quarter when the AS/400 is scheduled to make the quantum leap to the 64-bit PowerPC architecture.

AS/400 customers such as Marc Novik, director of information management at the Miami-based HealthInfusion division of Coram Healthcare Corp., are eagerly awaiting the coming makeover.



Source: Annex Research, Phoenix

Moving forward

Novik said he wants to use the AS/400 as a server for applications running on multiple platforms, and he noted that IBM appears to be "keeping in touch with what's happening in the business environment." HealthInfusion expects to start moving to PowerPC-based hardware in late 1995, he added.

Rich Kolbe, director of MIS at Harley-Davidson, Inc. in Milwaukee, agreed that the AS/400's "arrows are all pointing in the right direction" — toward client/server. "We haven't gone to great depths yet, but we've been pleased with what we've done and we plan to go further," Kolbe said.

Rebound expected

Bob Djurdjevic, president of Annex Research in Phoenix, said he expects the changes wrought by IBM to restore the AS/400 to strong growth in 1995 after three years of sluggish demand (see chart). The midrange system, which was introduced in 1988, appears to be poised on the threshold of a second life, he added.

The new hardware and software will "change the fundamental nature of the AS/400" and make it more useful in client/server environments, agreed David Andrews, managing partner at D. H. Andrews Group, Inc. in Cheshire, Conn.

However, he said application vendors probably will not be able to deliver products that take full advantage of the features being added to the OS/400 until late 1995.

Mainframes to experience more renewed growth

By Craig Stedman

The mainframe enters the second year of its new life with all signs pointing to a continued resurgence. Shipments of System/390 MIPS are expected to top the record level reached during 1994, and some analysts even project that IBM's mainframe revenue will increase for the first time in five years.

But amidst all the hoopla for a platform that much of the industry had written off just a year ago, winds of serious change are blowing. 1995 is shaping up as the first big year of transition from water-cooled mainframes to IBM's CMOS-based and air-cooled parallel systems.

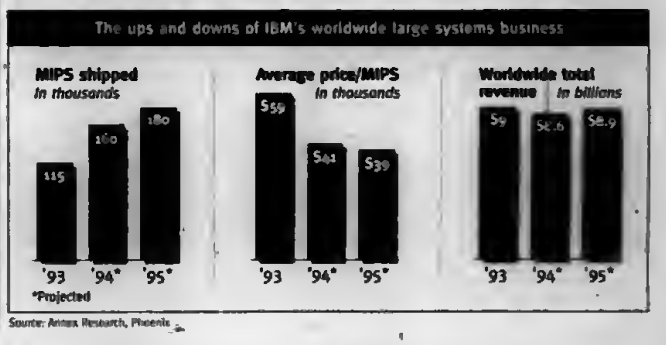
IBM started shipping CMOS-based machines last spring, but the initial 13 MIPS processor is only powerful enough to handle about 25% of System/390 workloads, according to Charlie Burns, an analyst at Gartner Group, Inc. in Stamford, Conn. By comparison, traditional processors based on emitter-coupled logic technology run at up to 60 MIPS.

A second-generation CMOS engine due in May appears to have contracted from a promised 23 MIPS speed to 21 MIPS, Burns said. But that should still bulk up the air-cooled systems to the point where half of existing mainframe jobs can run on them "without people having to do any unnatural acts," he added.

As a result, Burns said the parallel machines could account for as much as 40% of IBM's mainframe revenue during 1995, up from about 15% in 1994. This is good news for customers because IBM has dropped the price of the CMOS-based machines below the cost of traditional ES/9000s, he noted.

"1995 is really the year that the true

Mainframes, *page 85*



Source: Annex Research, Phoenix

CA aligns 1995 product rollouts with OLE

OpenRoad to also gain OCX capabilities

By Thomas Hoffman

■ Many of Computer Associates International, Inc.'s 1995 product rollouts will rely heavily on OLE 2.0 technologies.

One of these will be CA-OpenRoad for Windows NT, a graphical fourth-generation language for client/server application development that will ship next fall.

OpenRoad will take advantage of Microsoft Corp.'s Object Linking and Embedding (OLE) 2.0 and OLE Custom Controls (OCX). The product's exact ship date will depend on when Microsoft delivers Windows 95, the next version of Windows, next summer.

Other CA application development tools, such as CA-Visual Objects, CA-Visual Realia and CA-Realizer, will also be outfitted with OLE 2.0 and OCX capabilities later in 1995, according to Russell M. Artzt, executive vice president of development at CA.

"My goal is to be right there when Microsoft ships" Windows 95, Artzt said.

The wait is over

Also expected to ship in March will be CA's long-awaited Novell, Inc. NetWare version of the CA-Unicenter systems management package, soon to be followed by a Windows NT version. Artzt said development of CA-Unicenter for Windows NT "has been especially challenging because of the newness of it. [Microsoft] has gone through quite a number of development changes with NT, and you just have to roll with it."

CA has also been working closely with IBM on its Distributed System Object Model (DSOM), an initiative to provide IBM shops with a common object model over distributed networks. CA is trying to make its CA-Unicenter 2.0 systems management package DSOM-compliant by the time it goes into beta testing in the third quarter of 1995, according to Yogesh Gupta, senior vice president of open systems at CA.

Availability of those products should help CA expand its growing CA-Unicenter revenue stream. For the quarter ending Dec. 31, 1994, CA-Unicenter revenue was projected to top out at $55 million, according to Charles E. Phillips, a financial analyst at Kidder, Peabody & Co. in New York.

When the NetWare and Windows NT versions start shipping, CA-Unicenter revenue should reach $80 million per quarter, Phillips said.

Flagship sets sail

CA is also emphasizing its new flagship manufacturing package, CA-ManMan/X, which it bought with the Ingres database when it acquired The ASK Group, Inc. last June.

Artzt said CA is currently developing multiplant support for the Unix-based manufacturing package. A new release of CA-ManMan/X with those features should ship by late 1995, he said.

On the way

CA is readying gateways that would allow its CA-IDMS and CA-Datacom mainframe database users to share data and applications with its CA-Openingres Unix-based database management system. Gateway connections among the databases are scheduled for beta testing in March with shipments planned for June. Replicators — to allow data produced in one environment to be reproduced in the other — should be released in late 1995.

Digital vows to return to profitability in 1995

Analysts say company is positioned for success

By Neal Weinberg

Digital Equipment Corp. faces a make-or-break year in 1995 as it battles to get back in the black.

Digital has not had a profitable year since fiscal 1990, and its losses since then have totaled a staggering $5.8 billion. The company has laid off more than 30,000 people — 25% of its workforce — in the past couple of years.

Chief Executive Officer Robert Palmer has set a goal of profitability by the end of June, and most analysts say that can be achieved if the company executes its game plan.

CEO Robert Palmer *has set a goal to make Digital profitable by the end of June*

On the cost side, Palmer's decision to do away with matrix management in favor of a more streamlined business unit approach as well as the company's move toward indirect sales channels give the company more opportunity to cut back in those areas, said Brad Day, an analyst at Dataquest, Inc. in Framingham, Mass.

At the same time, Digital has to show revenue growth, especially from the company's Alpha AXP workstations and servers, Palmer said.

"They seem to be coming out of the tunnel, although the final grades aren't in yet," said Francis B. Brake, managing director of technology business development at Newport News Shipbuilding and Drydock Co. in Newport News, Va.

Brake said he is impressed with the Alpha chip technology and that Palmer is "doing at least as good a job as any other executive in that industry." He added that Digital may have "hit a couple of stumps in the road," but he still views the company as a "viable source of solutions."

Wes Melling, an analyst at Gartner Group, Inc. in Stamford, Conn., said one of the major growth opportunities for Digital is Microsoft Corp. Windows NT clusters. He said Digital is "as well positioned as anyone" to take advantage of NT growth next year.

Digital's other challenge is "to figure out how best to work with the loyal installed VMS base," Melling said. He said it remains to be seen if Digital can meet that challenge.

There are positive signs for Digital: Revenue in the latest quarter was up 4%, the company's stock price has nearly doubled in the past six months from a low of about $18 a share to a current price of about $34 a share, and sales of PCs and Alpha workstations and servers are ramping up.

Up, up and away

Alpha AXP workstation and server sales increased 164% in fiscal year 1994, according to company figures.

"A lot depends on the last quarter of 1994," said Jim Brennan, an analyst at WorkGroup Technologies, Inc. in Hampton, N.H. Digital has to show progress toward profitability or risk losing credibility with customers, he said.

In early 1995, Digital will roll out new Alpha AXP workstations and servers based on the faster, more powerful EV-5 chip. Digital will also come out with models to augment its successful PC offerings.

On the software side, Digital will offer a new version of LinkWorks groupware. And in networking, it will emphasize Asynchronous Transfer Mode products.

Briefs

EA Systems makes buy

EA Systems, Inc. in Alameda, Calif., has purchased Digital Equipment Corp.'s Plant Applications and Systems for Concurrent Engineering (PASCE) software business. PASCE is a database-driven plant design and management system. EA Systems will focus on providing software to the power and process industries for plant life cycle management.

Arbor releases upgrade

Arbor Software Corp. announced an upgraded version of its multidimensional database system that includes a user interface with the same look and feel as Microsoft Corp.'s Office.

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Mainframes

CONTINUED FROM PAGE 83

mainframe alternative becomes real," agreed Carl Greiner, an analyst at Meta Group, Inc., also located in Stamford. "It's a set-up year where we'll start to see the end [of water-cooled purchases] except in the really big shops."

Some mainframe shops are champing at the CMOS bit, spurred on not only by lower costs but by a promise of increased flexibility that the air-cooled technology is supposed to bring to the System/390 environment.

Jawaid Ekram, director of systems and technology at Galileo International in Englewood, Colo., said the online reservation consortium wants to start migrating to CMOS in mid-1995. "People like us running transactions can get by with 21 MIPS" per processor, he said, although most batch-processing applications still require more power.

Besides reducing the cost of mainframe computing, the new technology's parallel nature should improve resource management by making it easier to switch CPUs to different workloads as processing needs fluctuate, Ekram added. That could help during Galileo's heavy processing cycle at month's end, he said.

Greg Dzieweczynski, technical manager for database services for the state of Minnesota in St. Paul, said the state is also considering moving to a coupled sysplex based on CMOS technology in 1995. The air-cooled machines will be much more appealing once the faster processors are available, he said.

However, Dzieweczynski added that the state will reopen the matter next summer to see if it wants to delay the migration, which would also require updating all of its mainframe software. "It's a big step just to get to the fork in the road where you can go to the CMOS technology," he said.

Client/server suite trend continues

By Rosemary Cafasso

The trend toward integrated client/server applications suites — which helped propel SAP America, Inc. and Oracle Corp. to the top of the market in 1994 — will continue in 1995.

This means the big names will continue to dominate this arena, while smaller and more narrowly focused firms such as Platinum Software Corp. and Coda, Inc. will have to devise more schemes and partnerships to provide users with full suite-like solutions. Both Platinum and Coda focus on financials.

"They either have to come up with all the functionality, or they'll have to come up with a very straightforward integration approach," said Harry Tse, a research director at The Yankee Group in Boston.

The movement to suites shows that users "are trying to cut down the number of vendors they do business with," said Jeff Comport, an analyst at Gartner Group, Inc. in Stamford, Conn.

However, Comport said he does not expect this shift to big-name suite suppliers to cause a shakeout — yet. "We see more vendors than the market can support, but there's still a window of opportunity in 1995 and 1996 to differentiate themselves," Comport added. "We predict by 1997 there will be a shakeout that removes up to one-third of the vendors."

On the technology side, analysts said they expect 1995 to be the year when workflow assumes a key role in client/server applications. For example, after more than a year of talking about it, PeopleSoft, Inc. will roll out workflow capabilities as part of its application line in 1995.

At least one analyst said Microsoft Corp.'s Windows NT will get a shot in the arm next year in the client/server applications front.

While NT will not overtake Unix as the most frequently used operating system anytime soon, "it will take a real rush at Unix," said Ed Black, an analyst at Aberdeen Group in Boston.

The wild card in 1995 will likely be Computer Associates International, Inc., which has rolled out a set of multiplatform accounting packages and has the marketing might to take on SAP and Oracle, analysts said.

What's up for some of the big names in client/server software:

SAP America is expected to deliver R/3 "lite," a scaled-down version of its integrated client/server software now in the labs under the code name Heidelberg.

PeopleSoft said it will launch several additional financial software modules.

D&B Software will focus on pushing its own integrated suite, which was just completed in late 1994.

Oracle will ship its first full-blown graphical user interface client/server applications.

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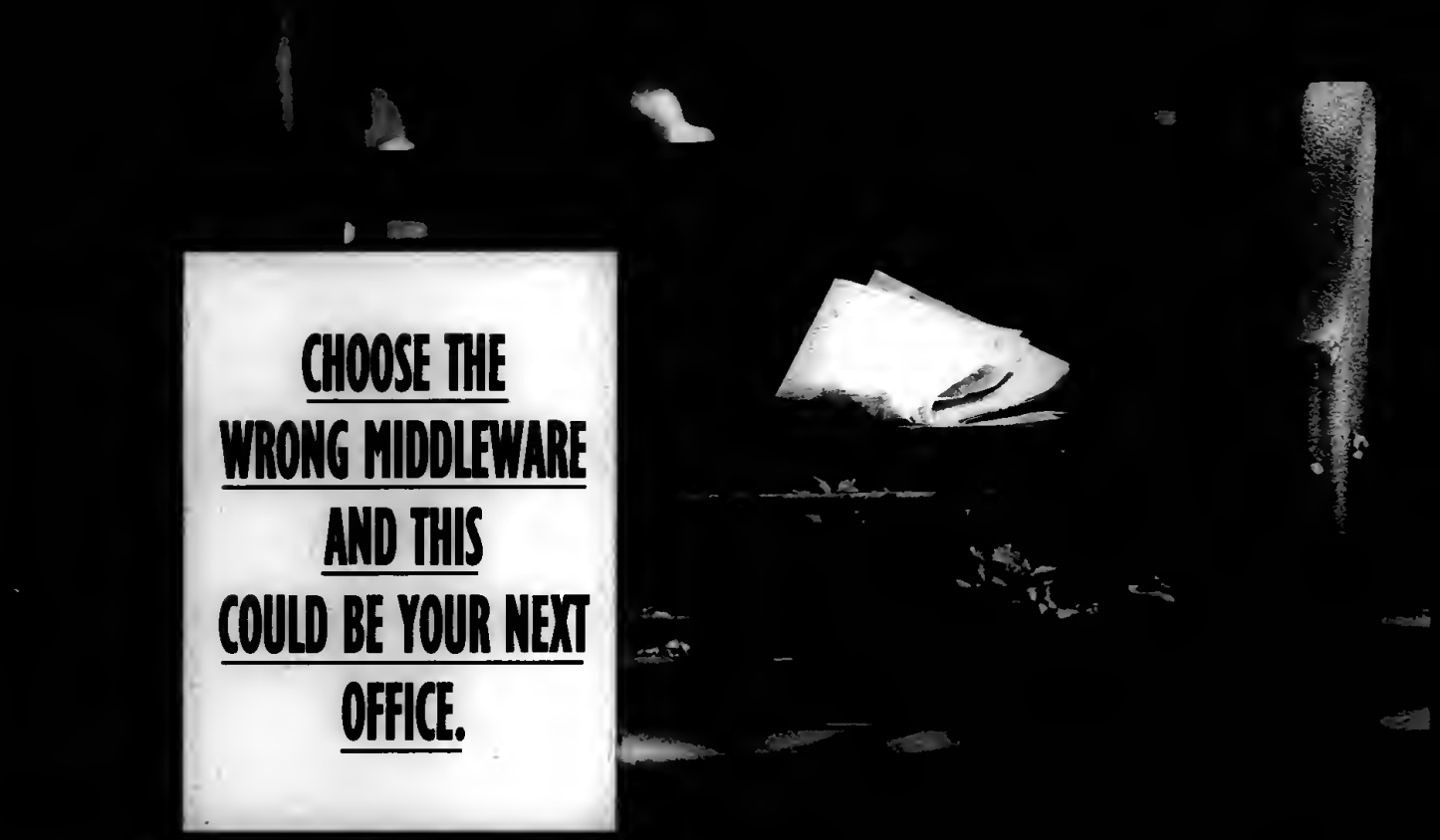
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Information Builders

DBMS vendors seek to fulfill vows

By Kim S. Nash

Database makers will spend the first half of 1995 making good on vows taken in 1994.

Ironically, improving core database engines is but one item on the respective agendas of the big Unix relational players. Perhaps more important for Oracle Corp., Sybase, Inc., et al is proving they have more to offer in the coming year.

Hot tools

The No. 1 goal from the database leaders will be providing good graphical client/server development tools. Oracle is slated to unveil its much-hyped Project X tool kit in mid-January. Project X is a PC-based tool whose language is Basic, with some object functionality. The product will support Windows, OS/2 and Macintosh systems, which has worried some of Oracle's bread-and-butter Unix users who are concerned about ending up second-class citizens.

To allay that fear, Oracle plans to ship a series of fancied-up, graphical tools for Unix developers — Cooperative Development Environment 2 — during 1995's first half.

Sybase users, meanwhile, await word from the company about the fate of its near-finished Build Momentum development tools. Sybase's proposed $900 million acquisition of Powersoft Corp. in November is likely to mean the demise of Build in favor of Powersoft's tools.

At the same time, Sybase must also combat perceptions that Powersoft's products will no longer be database-neutral. This is a key selling point that helped make Powersoft so successful in the first place.

Informix Software, Inc. will be busy too, adding features missing from the first release of its client/server tool, New Era. The ability to split, or partition, application logic between server and client is due to be added by midyear. Before then, Informix has promised to add an object browser to New Era.

Aside from tools, users see a crying need for solid systems management utilities in 1995. Computer Associates International, Inc. plans to integrate its recently acquired Ingres database into its Unicenter systems management product set but has refused to specify a date for completing the work.

The Islandia, N.Y.-based CA also plans to ship upgrades of the Ingres database and related add-on products for replication and managing distributed systems in the second quarter of 1995.

Indeed, Sybase, Informix and Oracle are all working with companies that make systems management products, several of which have mainframe histories.

War unlikely

Talking strictly databases, Oracle and Sybase will make a strong run at Microsoft Corp. in the low end by creating slimmed-down versions of their systems for IBM's OS/2, Novell, Inc.'s NetWare and other departmental-level operating systems. Users should expect a thrust-and-parry situation in this market regarding pricing, although industry observers doubt it will become an all-out price war.

While Oracle and Sybase jockey for position, however, Microsoft will fight for its own chance at the big-time enterprise-caliber database arena. Microsoft's SQL Server 95 database, for example, is supposed to include some sophisticated aids for monitoring and troubleshooting remote databases from a central site. SQL Server 95 is also expected to be able to support many more users than Microsoft's current database, SQL Server 4.2.

Elsewhere, lesser known database players plan to get into some of the hotter technologies, hoping to do the big guys one better. For example, Praxis International, Inc. plans to ship OmniReplicator, a device designed to allow two-way replication between IBM's DB2, Sybase's System 10, Oracle 7 and other databases. In comparison, Oracle does not offer similar bidirectional replication; Sybase plans to offer it in first-quarter 1995.

Worldwide database sales

Database type	1994	1995*	1996*
Mainframe relational	$1B	$1B	$960M
Object-oriented	$80M	$90M	$115M

*Projected
**Multiuser database running on OS/2, NetWare or Windows NT

Source: Ovum Ltd., London

To date, no date set

Microsoft has steadfastly refused to specify a ship date for its SQL Server 95 database other than to say that users will receive it in — you guessed it — 1995

Development tools

No clear answers for users on client/server development front

By Rosemary Cafasso

Anyone looking for clarity should stay away from the application development market next year.

Observers expect the turbulence and confusion of 1994 to roll into 1995 with no letup in sight.

Here's why: Development tools from many companies are being transformed to provide more object-based development platforms for client/server computing. These include products from low-end tool providers, database companies, start-ups pushing very high-end development tools, traditional fourth-generation language companies and the old line computer-aided software engineering companies, to name just a few.

Not getting any easier

The bad news for users is that no clearly superior approach to client/server development will emerge next year, which means decision-making will continue to be difficult.

"The two words are objects and repositories for 1995," said Curt Monash, president of Monash Information Systems in New York. "Right now, use of them is trivial. But we are on a several-year track to get fully object-oriented and highly repository-[driven]."

On the low end of the development scale, companies such as Powersoft Corp. will try to move away from the client-centric label and become enterprise-class players by adding high-level functions such as partitioning. Powersoft has scheduled rollouts of high-end functions starting in 1995 and continuing well into 1996.

Although PowerBuilder and competitors such as Gupta Corp.'s SQLWindows and Microsoft Corp.'s Visual Basic are criticized for not being enterprise-class, some observers expect this market segment to still be plenty hot next year.

"There will continue to be a lot of momentum in that area," said Judith Harwitz, president of Hurwitz Consulting Group, Inc. in Watertown, Mass. She noted that low-end tools are a good entry point for client/server development. "People now want to build bigger things, but it is only a small segment that has already made the migration to client/server."

The lower end tools market will not be the only busy segment. The database vendors will be "rearmed and much more competitive" with tools in 1995, said Brent Williams, an analyst at Gartner Group, Inc. in Stamford, Conn. (see story above).

Projected worldwide application development tools revenue by operating environment

	1993	1994	1995
Mainframe	$7.3B	$7.3B	$7.4B
Mini	$3.1B	$3.3B	$3.5B
Unix	$5.0B	$6.3B	$8.1B
Network OS	$245M	$335M	$442M
Windows NT and OS/2	$692M	$1.1B	$1.8B
DOS/Windows	$5.3B	$6.1B	$6.8B

Source: International Data Corp., Framingham, Mass.

Hot market

The object-oriented programming market will increase from about $319 million in worldwide revenue in 1993 to about $2.2 billion in 1998, according to International Data Corp. in Framingham, Mass.

The high end of the market, which got a jump start in 1994 with launches from such companies as Forte Software, Inc. and Dynasty Technologies, Inc., should heat up as well.

"I predict there will be a lot of new products here," Harwitz said. "If you compete against a Visual Basic, it's hard to make money. The perception is [the high end] is where the money will be."

Well-managed objects hold great promise

Cost and time savings top benefits for adopters

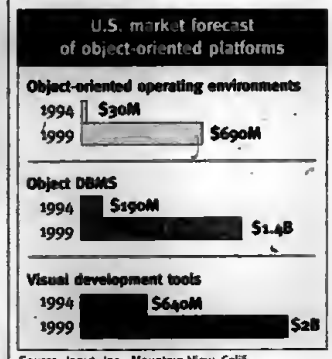
By Gary H. Anthes

The market for object-oriented technology will skyrocket during the next five years, but users will not realize its potential unless they establish an organizational and technical environment geared toward the technology.

Those are the central conclusions in a new report from Input in Mountain View, Calif. In "Object-Oriented Platforms for Client/Server Systems," Input said the U.S. market for object-oriented development tools, database management systems and operating environments will grow at a compound annual rate of 36% through 1999 (see chart).

While there is some disagreement as to just how critical object-oriented technology really is to information systems organizations right now, Input is clearly bullish on the concept. "Objects are essential for programming client/server systems of complexity," the report said. "They are reducing the time to create systems, the cost of updating them and the cost of adding additional components."

Input said that financial services, health care, document processing, government and telecommunications users are all early adopters of object-oriented technology.



Source: Input, Inc., Mountain View, Calif.

Angela Hey, client/server program manager at Input, said there would not be a mass migration from Windows to NextStep, the object-oriented operating environment from Next Computer, Inc. "But I do see a few very high-quality organizations using NextStep and getting a competitive advantage — companies like Swiss Bank, Chrysler Financial and some of the telephone companies," she said.

Benefits for all

Even companies that do not use object-oriented tools in their development efforts may see the benefits of it via systems integrators and outsourcers, Hey said. These developers, especially the small aggressive ones, use the time savings from object-oriented approaches to move away from the traditional time-and-materials billing for development services, sometimes sharing the resulting savings with customers, she added.

Hey offered the following advice to users of object-oriented technology:

- Standardize as much as possible on a small number of object-oriented vendors and tools. Otherwise it will be more difficult to share objects across platforms.
- Have relatively senior, well-trained staffs manage the storage and reuse of objects and guide developers in the use of the technology.
- Have "product champions" who can sell the use of object-oriented technology within the company to stimulate its adoption.

Hey said organizations that have not followed this advice have often succeeded with small pilot systems based on object-oriented technology but have then failed to scale up to enterprisewide use.

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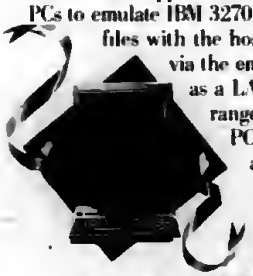

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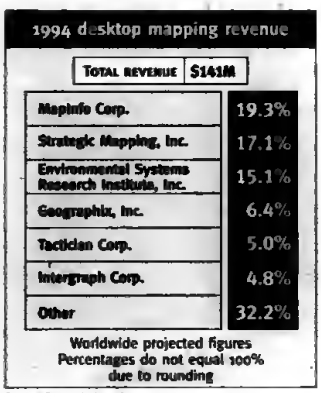
GIS changes spur IS choices

By Mitch Betts

■ The desktop mapping software industry underwent dramatic changes in 1994, with vendor repositioning, price cuts and revolutionary deals to embed mapping capabilities in mainstream spreadsheets.

Now, information systems managers just have to figure out how to make sense of the changes in the geographic information system (GIS) market.



Source: Daratech, Inc., Cambridge, Mass.

As Dick Taylor, GIS director for Guilford County in North Carolina, recently put it, the GIS market has divided into three levels of functionality. At the high end are Unix workstations running heavy-duty environmental applications, while in the middle are robust PC packages such as MapInfo Corp.'s flagship product and Strategic Mapping, Inc.'s Atlas GIS.

Low end is all the fad

What is new for 1995 is the low end, where basic mapping capabilities are being embedded in new versions of popular business PC packages. Santa Clara, Calif.-based Strategic Mapping started the trend by adding a mapping feature and data to Lotus Development Corp.'s 1-2-3 Release 5.0 for Windows.

Troy, N.Y.-based MapInfo followed with an agreement to add mapping to 1995 versions of Microsoft Corp.'s Office suite and Excel spreadsheet. In mid-December, Strategic Mapping made the same kind of deal for Novell, Inc.'s PerfectOffice suite and Quattro Pro spreadsheet.

While the spreadsheet deals will bring the power of mapping to a vastly larger business audience, the new bottom rung on the GIS ladder also creates some market confusion, said Nora Sherwood, editor of *Business Geographics*, a magazine based in Fort Collins, Colo.

For the corporate IS manager, Sherwood said, the question in 1995 will be "What level of product is the right one for the next person who wants GIS? Is it Lotus' Maps, which is almost free, or a $20,000 GIS system?"

The industry goal is obviously to enlarge the market and hope that at least some spreadsheet users will want more than "mapping lite" and upgrade to the full-fledged PC software packages.

"It's too early to know how users will respond," said Bruce L. Jenkins, vice president of market research firm Daratech, Inc. in Cambridge, Mass. "Will it increase market awareness and build user demand for the stand-alone systems or will it just satisfy most users' needs?"

Moreover, the spreadsheet strategy has a dangerous side if the mapping features are too rudimentary or poorly implemented. "If they're crippled too far, it will sour the market's taste for GIS rather than expand the market," Jenkins said.

Vendors are also hinting that mapping can be embedded in other sorts of mainstream applications such as database management systems, graphics and presentation software and executive information systems.

If that happens, then IS staffers may soon be faced with managing a real hodgepodge of mapping software.

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Not a skill, but an attitude

IN THE COMING YEAR, TECHNICAL SKILLS WILL BE LESS OF A PRIORITY FOR HIRING MANAGERS. INSTEAD, BUSINESS ACUMEN AND AN APTITUDE FOR CUSTOMER SERVICE WILL BE FOREMOST ON THEIR MINDS.

BY CHERYL GERBER

Managers won't be looking for highly skilled technical specialists in 1995, but don't drop that networking class just yet. They're planning on hiring generalists — those who possess interpersonal and business acumen *in addition* to technical expertise.

"We currently support a myriad of platforms, including PC, mainframe, Oracle Corp. and Unix applications. So we hire people who have skill sets in all those areas," says Kathryn Ziemnik, manager and assistant vice president of personnel systems programming and development at Wells Fargo & Co. in San Francisco. "We're not looking for specialists."

One of the top skills required in 1995 will be the ability to understand and analyze the link between business and technology. And demand for that skill falls foremost on the shoulders of information systems managers.

"As the role of technology has become more prominent in how business is run, one of the most important skills for IS management is strategic thinking," says Elahe Hessamfar, chief information officer at Turner Broadcasting System, Inc. in Atlanta.

IS managers must be adept at partnering with the business side to drum up strategic solutions for opportunities and not problems, Hessamfar says. "We must be proactive [and] not reactive," she says. They must also have strong consultative skills. These, as well as a strong understanding of the business and strategic thinking, are the top skills Hessamfar seeks in IS managers. "Obviously, technical skills are important, but you can always buy that," she says.

Just as the need for strong business skills cuts across all industries, so does the need for systems integration. Ziemnik is melding multiple systems in banking as are others in the health care industry.

"As we integrate patient information with laboratory and pharmacy systems, we are moving off dumb [terminals] and onto intelligent terminals. And we are moving more processing onto networked PCs," says Joe Voloshin, systems manager at Adventist Health Systems in Roseville, Calif.

"Given the direction we're going in, it's networking expertise we're looking for," Voloshin says. "They don't need to be an expert in any one system. The strong

Skills, *page 93*

"We need people who work well with others and who know the internals of the business."
— Kathryn Ziemnik
manager and assistant VP, personnel systems programming and development
Wells Fargo

"It's networking expertise we're looking for. They don't need to be an expert in any one system. The strong skill is going to be the ability to integrate two or three systems."
— Joe Voloshin
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Skills

CONTINUED FROM PAGE 92

skill is going to be the ability to integrate two or three systems."

Voloshin says he is not looking for a Novell, Inc. certified NetWare engineer but for someone with knowledge of TCP/IP. "TCP/IP is a big one. Knowing how to use TCP/IP to integrate systems, how to take it from a local- to a wide-area network [and] how to configure and run it is probably more advantageous than knowing how to program a language now," Voloshin says.

Understanding networking is also a priority for Tom Andrews, director of technology services at Ball Corp., a glass and aluminum can manufacturer in Broomfield, Colo. "People who were only interested in operating systems now need a broader knowledge of network protocols such as TCP/IP," he says.

Burlington Air Express, Inc. in Irvine, Calif., has also upped networking on its list of desirable skills. The firm recently began replacing 120 IBM midrange systems with Unix LANs based on Hewlett-Packard Co.'s HP/UX, HP 9000 workstations and TCP/IP. Its top priority is to hire eight people with Unix, database and TCP/IP skills. "I'm looking to hire these people as we speak," says John James, Burlington Air's director of telecommunications and midrange processing.

James says he is looking for people who can switch their technical skills midstream. "We need people who are adaptable because change is constant. There's more flexibility with software in the Unix LAN environment," James says.

Change may be the theme that drives the IS skills that managers seek. Yet that ability may be one of the hardest skills to find. IS professionals "are agents of change, yet we are just as resistant to change as everyone else," says Patrick Hansen, CIO at UniHealth, Inc. in Burbank, Calif. "But we have a strategic plan here which envisions a significant amount of change. Subsequently, we need people who want to deal with change."

Stiff competition

Increased competition in the health care industry has raised IS departments' concern for financial performance but has also improved productivity and quality. With that, there is greater concern that IS staffers possess a keener understanding of the business and better interpersonal skills. Consequently, Hansen says he now looks for nontechnical skills first.

"I look for an ability to communicate well with customers. It's not a skill but an attitude. We need people who see their job as a customer service job first, not as a technical job," he says.

Now that the team-centered approach and client/server computing have arrived, IS professionals seem more concerned about hiring people who have the interpersonal skills needed for teamwork.

"We are moving into more teamwork instead of the entrepreneurial style that helped us to grow to where we are now. We are looking for [soft skills] now — the ability to communicate and to empathize," says Stanley Kober, associate director of litigation systems at Pfizer, Inc., a research-based health care manufacturer in New York. "If a team is going to work well together, the members must be able to understand each other and to compromise."

Clearly, the days when business tolerated or felt intimidated by technical jargon are gone. Now it's up to IS to communicate technical concepts effectively in business terms.

And as business becomes more integrated with technology, the lines between technology and business will fade. The technicians of today will become more businesslike tomorrow. "In the future, it will be harder to recognize the difference between the CIO and the vice president of operations," Hessamfar says. "The CIO will take a major business role just as technology becomes a more integral part of business." ■

Gerber is a free-lance writer in San Francisco.

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Pros. Performers. Partners in Excellence.

However we describe them, our people make us great.

We're Decision Consultants, Inc., one of the largest privately-held information consulting firms in the country. Our outstanding people make client service their priority — and our continued growth in each of the last 10 years proves the point.

We are seeking professionals with strong technical expertise and the creative ability to define solutions for our leading edge clients in the following areas:

The most satisfying careers are a result of quality, dedication, commitment and integrity.

- C, OS/2, PM
- APL/APL2
- C/C++, WINDOWS SDK
- DMS SWITCHING SOFTWARE EXP
- ORACLE DBA
- VAX/VMS SYSTEM MANAGERS
- SMALLTALK
- UNIX, C/C++, X MOTIF
- STRATUS, VOS, C
- UNIX SYSTEM ADMINISTRATORS
- COBOL II, DB2
- LAN INGRANT NETWORK ADMIN
- PROTEL
- IMS DB/DC
- C/C++, OS/2, PM, WINDOWS NT, DB2/6000
- IDMS/ADSO
- ORACLE FINANCIALS DEVELOPMENT
- INFORMIX, SYBASE OR ORACLE
- POWERBUILDER, UNIX, C
- IEF

Exciting projects exist in client/server, telephony and IBM mainframe environments, to name just a few. We offer competitive compensation and exceptional benefits that include tuition reimbursement, 401(k) and 3 weeks vacation. For consideration, send your resume indicating location preference to National Recruiting-CW, DECISION CONSULTANTS, 5000 Quorum Drive, Suite 410, Dallas, TX 75240. Ph. 1-800-304-4DCI, Fax 214-386-0741. INTERNET: dci@dica.com EOE M/F/D/V.

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- Net Ware Admin
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- NOVELL ADMIN
- SMALLTALK
- SQL SERVER, ACCESS
- SYBASE, ORACLE
- AS/400 RPG

ProTech Systems Group, Inc.
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Fax 901-767-8350

South Carolina

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Technical Trainers

Learning Tree International Training Services

Invest in Yourself, Invest in Us!

If you have a background in application/systems development and/or have demonstrated the ability to learn detailed leading-edge technical topics quickly and thoroughly, please read on.

We are looking for self-starting, organized, highly motivated individuals to teach state-of-the-art training courses. Selected candidates will be provided with the opportunity to develop skills in Object-Oriented and Client/Server technologies.

American Management Systems is one of the nation's leading suppliers of technical training and consulting to Fortune 1000 companies. We provide excellent compensation, benefits, training, and challenges in leading edge technology. Opportunity to travel.

Please send resume to Bill Marul, AMS Training Services, 300 Chapel Rd., Manchester, CT, 06040-9926, FAX (203) 646-8221

Grow With Us.

Technology Consulting, Inc. is a dynamic and rapidly growing Software Development Firm with challenging assignments. We are a leader in application outsourcing. Current client projects and our regional development center require the following skills.

CLIENT SERVER - C,C++, Smalltalk, Visual Basic/C++, MS/Access, Oracle, SQL*FORMS, Sybase, Powerbuilder, Windows SDK NT, Foxpro

AS/400 - RPG/400, COBOL

MAINFRAME - COBOL, CICS, IMS DB/DC, DB2, Natural, Construct, INFORMIX, EDI, UNISYS, TIP/DMS, SQL/DS, VM

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1995 offers opportunity to healthcare professionals with hands-on experience in vendor software such as SMS, HBOC, Cerner, Amentech, FDC and others. Our members work with hospitals, managed care groups, medical offices in the re-structuring of today's healthcare delivery. We install, implement, upgrade, we develop strategic plans, we re-engineer. If your background includes this type of results-oriented, hands-on effort, move your career into high gear.

Talk to our consultants in a confidential information exchange. We'll tell you about travel, advancement, benefits, that no relocation is required. Our first ten years were terrific – the NEXT ten will break all the records. You can be a part of that. Call our recruiters.

Lawrence Cater 810-932-2262 ● **Nancy Guyton** 314-725-1654 ● **Ed Moody** 404-984-9933

OR, write to us:

SUPERIOR CONSULTANT CO., INC.
31731 Northwestern Highway, Suite 250 West
Farmington Hills, MI 48334
810-855-0960

Equal employment opportunity is given regardless of race, color, religion, sex, national origin, ancestry, physical or mental disability, medical condition (including cancer related), marital status, veteran status or age.

Exclusive 1995 Career Opportunity for Software Developers

Our client is a very prestigious consulting company that seeks to challenge the software developer with the "Big 6" image. We are looking for an elite group of software developers with backgrounds in SmallTalk, C++, OO A & D, RDBMS and GUI skills.

- Software Developer with C++ or SmallTalk to research tools such as VisualWorks (ParcPlace), VisualAge (IBM) or Parts (Digitalk).
- Programmer/Analysts at all levels for OO Application and Development in C++, SmallTalk at client sites. Experience with RDBMS's, GUI design and implementation (Visual Basic, Motif) is desired.
- RDBMS technologist with knowledge of Data Mining, warehousing and Oracle.

In addition to having the above skills, the client desires the software developers to have a college degree (the more advanced degree, the better). Of course, an excellent compensation package is available along with a generous benefit package.

For immediate consideration, please send or fax your resume to:

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Fairfax, VA 22031
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FAX: (703) 573-3612

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Systems Network is a professional services firm specializing in Information Technology and ISO 9000 quality systems. In support of projects for Fortune 1000 clients located in the Southeast, we are searching for contract and full-time professionals who have a minimum of two years' experience in one of the following.

- ✔ Andersen's DCS/Logistics
- ✔ AS/400 Client/Server
- ✔ COBOL, CICS, DB2
- ✔ HPUX/UNIX System Admin.
- ✔ Informix DBA & 4GL
- ✔ PowerBuilder
- ✔ Sybase DBA
- ✔ Windows NT
- ✔ UNIX, C/C++

For immediate consideration, please fax or forward your profile to:

Systems Network
3001 N. Rocky Point Dr. E. #340
Tampa, FL 33607

(800) 676-0812 • Fax: (813) 282-1653

Career Opportunities

LAWSON SOFTWARE is a global leader in client/server business applications software. We design, develop, market and service business applications software for large companies of all industry types. Due to our tremendous growth, numerous career opportunities will be available throughout 1995 in our regional offices and corporate headquarters located in Minneapolis, MN.

REGIONAL POSITIONS

Account Managers

Responsibilities will include providing our clients with software implementation, project management and issue resolution. Ideal candidates will have project management and implementation experience, as well as a strong understanding of implementation methodology and customer satisfaction. Experience using project management tools and exceptional verbal and written communication skills a must. This position requires the ability and flexibility to travel and eight to ten years of related experience.

Consultants

Finance/Human Resources/Materials Management

We are seeking Software Consultants for each of the following: Materials Management, Human Resources and Finance. Responsibilities will include providing end-user classroom training and consulting services utilizing Lawson's products. Requirements include a bachelor's degree in a related field along with public speaking skills. Two to four years computerized business application systems experience on UNIX, AS400 and/or implementation skills an added plus. Excellent communication, interpersonal and problem-solving skills necessary. Overnight travel required.

UNIX Technical Service Consultants

Responsibilities include product installations, technical training and operational usage consulting to our diverse client base. Requirements include at least two to three years UNIX operating system administration experience along with installations and/or implementation background. Excellent communication, interpersonal, verbal and presentation skills essential. Experience with consulting/training a plus. Knowledge of Sybase or Oracle databases preferred. Overnight/out-of-town travel required.

CORPORATE POSITIONS

COBOL Consultants

Main responsibilities include providing technical and application support to our diverse client base, maintenance programming, testing, and documentation. Position requirements include a bachelor's degree or related field experience, plus a minimum 2 years COBOL programming experience. The ideal candidate will have the ability to be a self starter and possess excellent communication, interpersonal and problem solving skills. Experience with distribution systems preferred. UNIX operating system knowledge a plus.

RPG III Consultants

Main responsibilities include client issue resolution from phone consulting through maintenance programming and testing. Additional responsibilities include internal training/mentoring. Position requirements include 1 year RPG III programming experience, including financial applications. Excellent communication and problem solving skills essential.

UNIX Technical Support Consultants

Main responsibility is support of the LAWSON UNIVERSE environmental system to clients and regional service centers. Successful candidate will have 1 to 5 years experience performing development support, or administration in the UNIX open system environment. Experience with COBOL/C, Relational Data Base Systems, Graphical User Interfaces, and Network are added benefits. Excellent communication, presentation/training and problem solving skills a must.

We offer a competitive salary, comprehensive benefits and an opportunity to work in a quality-focused team environment. Please submit resumes (specifying position (as which you are applying), and salary requirements to Lawson Software, 1300 Godward Street, Minneapolis, MN 55413. Resumes for Regional positions should be to the attention of Services Staffing and Corporate positions to the attention of Corporate Staffing. EOE.

LAWSON Software

Atlanta Baltimore/D.C. Boston Chicago
Dallas Los Angeles Minneapolis New York Seattle

Our Vision Spans the Globe

INFORMATION MANAGEMENT & TECHNOLOGY OPPORTUNITIES

The [illegible] Division of [illegible], a worldwide leader in eye care products, is undertaking a significant revamping and migration of its core business systems as well as leading several new applications development efforts. To successfully accomplish this, we are looking for several seasoned professionals with excellent interpersonal skills to join our Information Management & Technology (IM&T) staff.

Bausch & Lomb offers a very competitive salary and benefits package. Qualified candidates should forward their resume along with salary requirements to:

Bausch & Lomb
Personal Products Human Resources
Department J
1400 N. Goodman Street - PO Box 450
Rochester, NY 14692-0450

BAUSCH & LOMB

Systems Project Manager-Client/Server
In this critical role, you will be responsible for the establishment of our client/server Center of Excellence as well as leading and managing client/server development staff in major application efforts. The successful candidate will have a BS/BA degree in Computer Sciences (an MBA/MS is strongly preferred) and 6-8 years of progressively more responsible IM&T project management experience, at least three of which should have been successfully managing application designers, programmers and business analysts in major applications development efforts.

Systems Project Manager
In this highly visible role, you will lead and manage critical projects and/or development groups and serve as the primary functional contact relating to resource allocation, budget, project timeliness and key deliverables. A BS degree in Computer Science or equivalent is required with an MBA/MS highly desirable. 6-8 years of progressively more responsible IM&T experience is required as is experience supporting applications in Finance, Sales, Marketing and decision support systems.

Applications Development Specialist - AS/400
This position provides AS/400 applications development support including programming and systems specifications development as well as technical support across a wide range of small to large business applications. You will need to possess a BS degree in Computer Science and 3-5 years of applications development using AS/400 technology.

Systems Development Specialist
This job provides application systems development support including design and development, client interface, project timeline management and directing staff and contractors as needed. You must possess a BS degree in Computer Science, 4-6 years of progressively more responsible project involvement/systems analysis work, and some combination of the following environments: AS/400, COBOL, PowerBuilder, SQL Server or other relational databases.

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DIVISION OF CDI CORPORATION

CDI Information Services is a provider of Professional Data Processing personnel. With over 27,000 technical people on assignment, CDI is one of the leading providers of professional services. Current requirements exist for a variety of skills including:

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Suite 204 - CW
Chantilly, VA 22021
Ph.: (703) 222-0700
Fax: (703) 222-7226

SOUTHEAST

Available positions include:
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- UNIX, OS/2 C, C++
- SmallTalk
- Oracle, Informix, Sybase
- DB2, Ideal, IMS, COBOL II
- Telephony S/W Development
- UNIX System Administrator
- Network Administrator

Send Resumes to:
S.E. Regional Recruiting - CW
1150 S.E. Maynard Road
Cary, NC 27511
Fax: (919) 467-7653
cdi@sedco.cary.nc.us

MIDWEST

Available positions include:
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- UNIX System Administrators
- UNIX Programmers
- AIX, OS/2 Software Engineers
- IMS DB2, COBOL, CICS
- Switching Systems, Cellular and PDAs
- OO-Stuff, C++, SmallTalk

Send Resumes to:
9035 Wadsworth Blvd.
Suite 2700 - CW
Westminster, CO 80021
Ph.: (800) 354-7214
Ph.: (303) 422-6668
Fax: (303) 422-4542
cdi@rmtcon.com

WEST

Available positions include:
AZ, CA, UT, OR

- IMS DB/DC, DB2, COBOL
- MAC PAC ID
- PowerBuilder
- Windows, GUI, C
- Oracle, SQR, Ingres, Sybase
- COBOL, CICS, DB2

Send Resumes to:
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Tempe, AZ 85281
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- Methodologists (OO, IE, AI)
- PC Help Desk Support

Please call or send resume to

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Houston, Texas 77063

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Nielsen Media Research the leader in the TV ratings industry and a dynamic division of a Fortune 500 Corporation relies on innovative technology to provide complex audience measurement data. Continued growth has created new opportunities at our Florida headquarters. All these positions require a degree in Computer Science or equivalent work experience.

SR. PROGRAMMER/ANALYST – 5+ years experience with C and C++, proficiency in SYBASE relational DBMSs (SQL, triggers, stored procedures), object oriented methodologies and UNIX, plus the ability to work on a RAD development team in an MS Windows environment.

LEAD SOFTWARE QA ANALYST – Three years experience as a QA Analyst with at least one year in a Client/Server environment. The Client/Server experience must be in a GUI (PowerBuilder preferred) RDBMS (Sybase preferred), UNIX, and C environment using test tools (Mercury Interactive preferred) and version control packages, such as PVCS or SCCS.

MS MAIL SPECIALIST – Provide technical solutions to highly complex LAN issues with your in-depth knowledge of MS Mail client, remote and server software, MS Windows, DOS, Novell MS LAN Manager and Windows NT. 4 years experience in LAN or E-Mail administration, and 2 years as an MS Mail Administrator are required. Knowledge of SMTP Gateways, UNIX, Banyan® Mail Check, SNMP, TCP/IP, and LAN management tools a desirable.

APPLICATION TECH. SPECIALIST – 5-8 years' experience in commercial software Windows development using C/C++ and 2 years hands-on development using PowerBuilder. 3-5 years' experience leading technical systems design on complex, full life cycle Windows applications (multi-platform, relational database preferred). Visual Basic, Excel Macro development and OLE.

DATABASE ADMINISTRATOR – We'll rely on you to design, implement and tune physical databases. 5-10 years' experience in software development of large complex applications, 3-5 years of relational database administration, and 1 year using SYBASE. Familiarity with Open Client/Server, Replication Server, C coding and Solaris is desirable.

We provide an excellent relocation package plus an attractive salary and benefits. Send your resume indicating position of interest to: **NIELSEN MEDIA RESEARCH, Human Resources Dept. CW0102, 375 Patricia Ave., Dunedin, FL 34698. FAX: (813) 738-3012.** An Equal Opportunity Employer M/F/D/V

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In addition to a Bachelor's degree in Management, IS, CS, Math or Business, you must have at least 2-5 years information systems experience and technical skills including:

- UNIX operating system
- 4 GL application development language (eg. Uniface, Oracle or Power Builder)
- Sybase or comparable Relational Database
- Knowledge of Windows program (MS, SQL or X)
- Experience with C, C++, EDI or main frame application development is a plus

We offer a very competitive compensation package and many opportunities for professional development. For consideration, please send resume with salary history to: Schneider National, Human Resources - ADA - 12CW-WH, PO Box 2545, Green Bay, WI 54306-2545. No phone calls or agencies please.

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SCHNEIDER LOGISTICS

SOFTWARE ENGINEER: (2 positions) 40 hrs/wk 8 a.m. - 5 p.m. $51,000/yr. Analyze design and develop computer software application systems on IBM 30xx mainframes utilizing CICS, DB2, CSP/AD and REXX. Develop utilities and write exit routines. Requires Bachelor's Degree in Computer Science or Mathematics. Requires 4 yrs. exper. in job offered or 4 yrs. exper. as Systems Analyst/Programmer/Consultant/Engineer. Requires work exper. in development of s/w systems on IBM 3090 utilizing CICS, DB2, CSP and REXX. *Employer paid ad.* E.O.E. Send resumes to: 7310 Woodward Ave., Rm. 415, Detroit, MI 48202. Ref. No. 15095.

CONSULTANTS

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CPL

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Reply with a cover letter and resume to:

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SOFTWARE ENGINEER (2 positions) 40 hrs./wk. 8am-5pm. $42,000/yr. Design and develop s/w systems for manufacturing applications on IBM 3090 and UNIX mainframes utilizing MVS, COBOL, CICS, DB2, CSP, IEF and ORACLE software. Gather user requirements, prepare external and internal design and test data. Require Bachelor's degree in Computer Science, Electrical or Mechanical Engineering & 3 yrs. exper. in job offered or 3 yrs. exper. as Programmer/Analyst. Work experience in developing s/w systems on IBM 3090 and UNIX systems utilizing MVS, COBOL, CICS, DB2, CSP, IEF and ORACLE. *Employer paid ad.* E.O.E. Send resumes to: 7310 Woodward Ave., Rm. 415, Detroit, MI 48202. Ref. No. 12785.

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They work at CIBER. We've just been recognized by FORBES MAGAZINE as one of the best 200 small companies in America because of our explosive growth. A growth rate of 28% over the last 5 years. This growth has also led to over 1,000 current openings for I/S consultants, more chances to work with the most current technologies in a variety of industries, and more Fortune 1,000 clients.

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Call us today. Or send your resume to: **CIBER National Recruiting, Dept. CW12, 4100 E. Mississippi Ave., Suite #1700, Denver, CO 80222, Phone: 1-800-669-0401, FAX: 1-303-782-4782.** Equal Opportunity Employer

CIBER

CBSI is seeking programmer analysts to work at client sites on the latest in computer technology. To qualify, candidates must have one year of experience, a willingness to learn and be open to relocation.

CBSI is an international computer consulting firm specializing in systems integration, software application development, programming and business process re-engineering. Our reputation for delivering on time, cost effective solutions has enabled CBSI to grow from a handful of employees in 1985 to an international company with over 1,000 employees in 12 offices and many project sites worldwide. CBSI is on the preferred vendor list for many different corporations and is ranked as one of the fastest growing private companies in Michigan and the U.S.

We are looking for candidates in the following areas:

Database	4GL	Operating Systems
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		TELON, APPS

CBSI is an equal opportunity employer offering a competitive salary and complete benefit package. Please send/fax resume to:

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- LOTUS NOTES DEVELOPERS
- VISUAL BASIC/C++/WINDOWS NT P/A's
- AS/400 RPG 400/COBOL PROGRAMMERS
- DBA's ORACLE/SYBASE/RDB
- EDI SPECIALISTS (AS/400, GENTRAN)
- IBM/DB2/COBOL/CICS P/A's
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Katie Kress
8304 Professional Hill Drive,
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SOFTWORKS, a rapidly growing provider of software products, offers opportunities for aggressive career growth. Our dynamic work environment provides creative Information Technology professionals with the ability to turn their ideas into leading edge products. SOFTWORKS offers a casual work environment, and a compensation package that includes competitive salaries, excellent benefits, and bonuses incentives.

Windows & Netware Developers

Developers are needed for workstation/server and communications software development, experience using WINDOWS, WINDOWS/NT, Visual C++, or OS/2 is required. CNE or ECNE is a plus for the Netware developers.

DB2 Software Development

DB2 Senior Software Developers needed for data base and systems administration products. Strong C/C++ experience with a minimum of 4 years software development. In-depth knowledge of DB2 catalog structures, utilities, DDF, DDCS/2 and SQL, as well as, DB2 DBA skills in a large production environment desired. Visual C++, Windows SDK, network/communication (APPC-TCP/IP) and any other relational data base systems a plus.

DB2 - SYBASE - ORACLE

Experienced DB2, SYBASE, ORACLE Database Administrators needed to implement, administer and support product development and production environments. Must have at least 4 years experience in any of the RDMBS listed in a large production environment. Experience must consist of both application and system administration support. Strong knowledge of software testing methodologies is required.

SYBASE Software Development

SYBASE Senior Software Developers for the development of database and system administration products. Strong C/C++ experience with a minimum of 4 years software development. Extensive knowledge of SYBASE 4.9 X/SYSTEM 10, in-depth knowledge of SYBASE catalog structures, OMNI SQL, and Transact-SQL are desired. Ideal candidate would possess both UNIX and/or WINDOWS/NT system administration skills. Strong DBA skills, knowledge of SYBASE database utilities (DBCC) and API's(CTlib, DBlib, OpenClient) are preferred.

MVS Systems Software Developers

Developers with experience in Assembler, CICS, DFSMS, DFHSM, ADSM, IMS, DB2, and RACF.

Professional Services Consultants

Disaster Recovery Professionals with a Minimum of 5 years experience. We are also accepting resumes of consultants with DFSMS, DFHSM, DB2, ADSM, and Communications experience.

For confidential consideration mail or fax your resume to SOFTWORKS attn.: Human Resources/ CWAD12

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Equal Opportunity Employer

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At C. W. Costello & Associates you can become a vital player on a team that has established itself as a major force in the I. S. consulting industry.

If you stand out from the crowd, we want to discuss our current employment opportunities with you. Our requirements include a college degree with a minimum of two years development experience utilizing any of the following skills: DB2, CICS, ORACLE, COBOL, MicroFocus, CASE Tools, IMS DB/DC, TELON, PACBASE, VISUAL BASIC, C++, POWERBUILDER and a variety of other Client/Server environments.

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Please fax or send your resume to...

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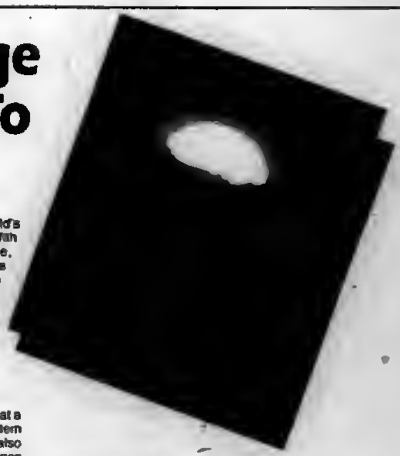

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Candidates should possess 3 or more years experience with UNIX System V, K-shell scripting, service hardware configuration TCP-IP and NFS, as well as structured testing methods.

ORACLE Database Analysts

Responsible for the design and generation of physical database structures, tuning SQL to improve performance, consult with application developers in the use of DBMS and SQL, and create/enhance standards for ORACLE database management.

Our environment extends to MVS/XA, DB2, SQL, CICS and data repository on our mainframes. Our UNIX client/server PC workstation environment includes Windows, ORACLE Connect/Gateway, ORACLE•SQLNet, ORACLE *Forms* 4.0, ORACLE•SQL and ORACLE PL/SQL.

Minimum of 3 years of experience in ORACLE database analysis, design and application implementation, as well as 1 year experience with ORACLE production database support, ORACLE application development and DB2 database design/development are required.

Development Managers

Manage all phases of applications development projects from initial business case through software release management. You will also lead teams in designing/implementing business strategic client/server based applications while managing client relations at all levels within our organization.

At least 6 years of applications development project management in a business environment and true PC or Client/Server project management experience are essential.

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Expand your expertise into security for our Client/Server environment by providing data security services in both the mainframe and Client/Server platforms while using your knowledge of TOP-SECRET to assist users with security issues/directions.

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All interested candidates must also have strong interpersonal skills, be team players, possess a solid combination of business acumen and technical aptitude and be willing to share their knowledge and expertise, as well as learn from others. Your interest in a career that emphasizes learning for the purpose of applying that knowledge to solve business problems is also critical to your success.

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PROGRAMMER ANALYST (2 openings) (Ref: 3385) at consult with clients to ascertain & define their business requirements or problem areas & utilize technical expertise to provide solutions at clients' needs, analyze design, develop & implement computer software for clients' EDP systems, analyze, design & develop Integrated Workflow System, process flow & data flow design, data modeling identification, technical support & overall design of application entry part of the system, and meetings with users to gather requirements. Apply the current Medical, AFDC & Food Stamp program regulations. Use UNISYS MAPPER 3801 on UNISYS 2200/900 & UNISYS 2200/400, DMS COBOL, C, NOVELL Netware, INFOCONNECT, design, develop & test computer software using UNISYS U6000/51 using Mapper, UNIX, C in the Banking Industry Reqs: Bach. in Comp Sci., Computer Information Systems, Computer, Electrical or Electronic Engineering, Systems Analysis or an equiv. & 2 yrs. exp. in job offered or 2 yrs. related exp. as a Programmer, Systems Programmer, Programmer/Analyst, Systems Analyst, Software Engineer, Consultant or Technical Assistant. Will accept 3 yrs. college ed. plus 3 yrs. exp. in job offered or related occup. in lieu of req'd ed. & exp. Related exp. must include system analysis, design documentation & implementation of various banking modules developed in MAPPER on U6000/51. $40,500/yr. 40 hrs/wk., 8:30a-5p.

PROGRAMMER ANALYST (2 openings) (Ref: 120094) at consult with clients to ascertain & define their business requirements or problem areas & utilize technical expertise at provide solutions to clients' needs, analyze design, develop & implement computer software for clients' EDP systems, analysis, design development & implementation of manufacturing software application on IBM mainframes using various software including PL/I, COBOL II, CICS, JCL, VSAM, developing applications using commercial database products such as IMS/DB & DB2, designing & developing computer software on IBM mainframe with MVS. Reqs: Bach. in Comp Sci., Computer Information Systems, Computer, Electrical or Electronic Engineering, Systems Analysis or its equiv. & 2 yrs. exp. in job offered or 2 yrs. related exp. as a Programmer, Systems Programmer, Programmer/Analyst, Systems Analyst, Software Engineer or Consultant. Will accept 3 yrs. college ed. plus 3 yrs. exp. in job offered or related occup. in lieu of req'd ed. & exp. Related exp. must include design development & implementation of online system on IBM mainframe & using CICS, DB2, COBOL II, IMS DB/DC, PL/1, JCL, VSAM, MVS/ESA. DESIGN/1 $48,000/yr. 40 hrs/wk., 8:30a-5p.

PROGRAMMER ANALYST (2 openings) (Ref: 120294) Analyses, design & development of a Customer Service System for a retail business. The responsibilities include technical support, low-level specs writing, coding, implementation, & meeting with users to gather requirements. The technical support provided will be for design of application using IEF, DB2 on IBM ES 9000 using IBM ES 9000, PS/2, MVS/ESA, OS/2, DB2, IEF used for System Design, TSO, PLATINUM, JCL, COBOL II, XPEDITER. Reqs: Bach. in Comp. Sci., Computer Information Systems, Computer, Electrical or Electronic Engineering, Systems Analysis or its equiv. & 2 yrs. exp. in job offered or 2 yrs. related exp. as a Programmer, Systems Programmer, Programmer/Analyst, Systems Analyst, Software Engineer, Programmer Analyst or Consultant. Will accept 3 yrs. college ed. plus 3 yrs. exp. in job offered or related occup. in lieu of req'd ed. & exp. Related exp. must include, in whole or part, working on IBM mainframe & using DB2, VS COBOL II. $44,280/yr. 40 hrs/wk., 8:30a-5p.

PROGRAMMER ANALYST (2 openings) (Ref: 3495) Lead analyst for analysis, design & development of a client-server based application. The responsibilities include analyzing the existing system, identifying new requirements from users & designing an object-oriented model for the new systems, analysis of the current system, assembly programming using IBM S/370, VAX & Motorola 680x0, using FORTRAN, C & PL/1, developing reverse engineering, compiler & language processing tools, developing applications using C++ & UNIX socket programming, working on multiple platform UNIX, VAX & MVS/VM, developing class libraries, compiler-compiler tools. Reqs: Bach. in Comp. Sci., Computer Information Systems, Computer, Electrical or Electronic Engineering, Systems Analysis or its equiv. & 2 yrs. exp. in job offered or 2 yrs. related exp. as a Programmer, Systems Programmer, Programmer/Analyst, Systems Analyst, Software Engineer Senior Systems Analyst or Consultant. Will accept 3 yrs. college ed. plus 3 yrs. exp. in job offered or related occup. in lieu of req'd ed. & exp. Must have some related exp. in each of the following: reverse engineering of C programs, & using VAX C++. $45,000/yr. 40 hrs/wk., 8:30a-5p. Send resume to 7310 Woodward Ave., Rm. 415, Detroit, MI 48202 & include Ref. # Employer Paid Ad.

Senior Business Systems Analyst: Analyze business procedures and problems at reform data and convert it to programmable form for electronic data processing, study existing data handling systems at evaluate effectiveness and develop new systems to improve production at work flow, specify in detail the logical or mathematical operation at be performed by equipment units and/or computer/interviewer computer programs, provide detailed reports at clients train end-users when necessary. SALARY $57,000 yr/40 hr week. REQUIREMENTS: B.S. degree in Cooking and Financial Management plus four years of experience in systems or program analysis. A working knowledge of the following is required: 1) Database/Analytical Tools: ORACLE, Case Tool: Sybase, Ideaus III Plus 2) Languages: C, COBOL, Basic 3) Operating Systems: Unix, DOS, VAX/VMI, Sunos, Novell Netware 4) Hardware Platforms: Software VAX SUN PC AT/XT-486. Resumes to: Mrs. Jennie Gaston, ALC Specialist, Job Service of Missouri, 13131 New Halls Ferry Road, PO Box 339, Florissant, MO 63032-0339. Refer to Job Order Number [illegible]. Applicants must establish that they have a right at be legally and permanently employed in the United States.

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Consultant, Software Development: Represent company in developing propriety information management solutions software design & develop applications software with Foxpro & SQL platforms: MS/DOS, Windows, DBMS & UNIX or Microsoft Access platforms & Visual Basic; develop algorithms for graphics image processing & visualization, create & enhance databases for systems design programming, testing & modifications of software training programs. $42,900/yr. 40 hrs/wk. M-F. M.S. in Computer Sc. or Ind. Eng. & Management & 1 year exp. as Software Development Eng. or Systems Analyst. Experience should include design & development of applications software & technical skills in FoxPro & SQL platforms, MS/DOS, Windows, DBMS & UNIX. Must have proof of legal authority at work permanently in the U.S. Send 2 copies of resume to the IL Dept. of Employment Security, 401 South State St., #3 South, Chicago, IL 60605. ATTN: Dennis Janes. REF #-IL 12331-0. NO CALLS. AN EMPLOYER PAID AD.

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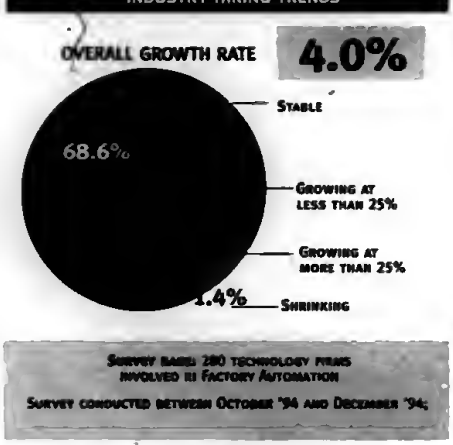

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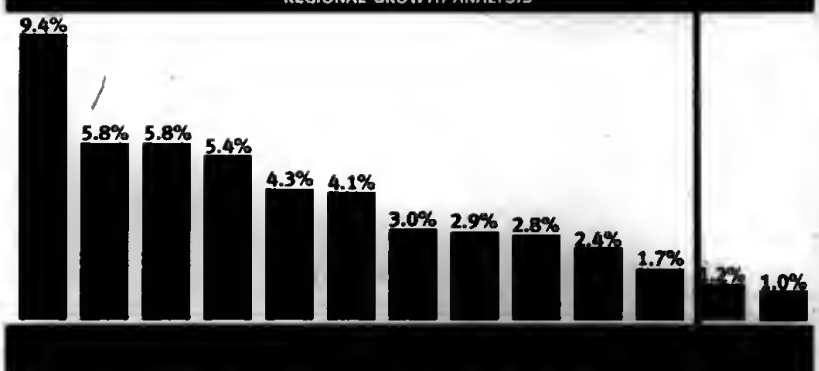

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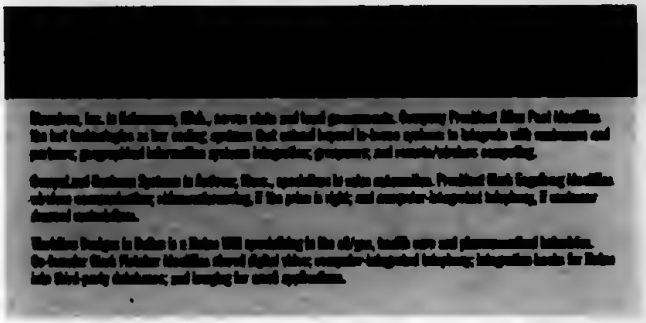
MIRROR, MIRROR on the wall

In 1995, buyers will see value-added resellers test new technology waters. The same caveats exist, however. Do business with established and financially stable shops.



Brandon, Inc. in Kalamazoo, Mich., serves state and local governments. Company President Allen Paul identifies the hot technologies as bar coding; systems that extend beyond in-house systems to integrate with customers and partners; geographical information systems integration; groupware; and remote database computing.

Geographical Business Systems in Bellevue, Wash., specializes in sales automation. President Mark Spradling identifies wireless communications; videoconferencing, if the price is right; and computer-integrated telephony, if customers demand synchronization.

Medallion Designs in Dallas is a Lotus VIM specialist in the oil/gas, health care and pharmaceutical industries. Co-founder Mark Fleischer identifies shared digital whiteboarding; computer-integrated telephony; integration hooks for Lotus into third-party databases; and imaging for small applications.

By Alan Radding

Value-added resellers (VAR) are hot. That's the word from analysts.

Long dismissed as poor cousins in the computer industry because of their small size, marginal financing and questionable staying power, VARs are suddenly attracting attention.

They're being flagged as part of an emerging group of niche players that will play an increasingly important role in the overall competitive picture.

The rise in VAR prospects, suggests Jeffrey Kaplan, director of research at Dataquest Worldwide Services Group in Framingham, Mass., stems from the growing complexity of technology and the need for flexible, nimble organizations that work closely with customers.

No longer just box pushers offering turnkey systems built around aging software, the best VARs put themselves in the forefront of technology but not at the bleeding edge, notes Jeffrey Geibel, managing partner at Geibel Marketing Consulting in Belmont, Mass. "VARs need to see market interest in a technology," he says.

"VARs are not early adopters," says Gene Bledsoe, partner at Casal Group Corp. in Dallas. When leading-edge technology matures to the point at which it can be turned into an effective solution with identifiable business value, VARs will jump on the new technology.

Due to a VAR's specialized nature — each has its own particular vertical or horizontal market focus — what is an emerging technology for one may be old hat or too far out on the edge for another.

Below, VAR consultants predict what's hot and what's not for VARs in 1995. But general talk of what's hot and what's not means little to individual VARs. They need to take their cues from their target market. Somewhere there are VARs still making a healthy living replacing aging minicomputer-based systems with PC and Unix LANs or providing dBase applications, all of which are mature technologies. ■

Radding is a free-lance writer in Newton, Mass.

WHAT'S HOT

ISDN AND CABLE TV MODEMS. This will be the year that VARs jump on the Integrated Services Digital Network (ISDN) bandwagon to add high-speed, low-cost connectivity to their solutions, predicts Mark Cuban, president of Radical Computing, a VAR consultancy in Dallas. Cuban says the cable TV network will be another way for VARs to offer high-speed connectivity.

VIDEOCONFERENCING. The widely heralded convergence of the computer and the telephone will become a marketable solution this year, Casal Group's Gene Bledsoe says. Moreover, Personal Technology Research in Waltham, Mass., projects that the market for PC-based videoconferencing will hit $120 million in 1995 and $2.1 billion by 1998. Cuban, however, urges caution. "Videoconferencing is a lot like pen computing," he says. "It is highly touted, but it is not revolutionary. It is going to be a niche product."

MOBILE/WIRELESS COMPUTING. Products, networks, standards and pricing for mobile computing are falling into place. "We'll see real product capabilities in 1995," Bledsoe says. Consultant Jeffrey Geibel adds, "VARs will see this as an enabling technology for sales force and field service automation."

THE INTERNET. The much-ballyhooed information superhighway will remain hot in 1995, and VARs that can help customers set up Web and other online servers will find themselves in great demand, Cuban says.

WHAT'S NOT

For some technologies, the ship may have left the dock already or has not even arrived:

GROUPWARE. "It has already happened. If a VAR is just getting into groupware now, then it is too late," says consultant Mark Cuban. Lotus Development Corp. has expanded its VAR base from 200 VARs to more than 6,000 VARs, according to recent estimates, leaving little room for newcomers. Still, the arrival of new groupware players such as Mesa Group, Inc. in Newton, Mass., and Collabra Software, Inc. in Mountain View, Calif., and Microsoft Corp.'s expected entrance late next year suggest more opportunities.

IMAGING. "Some VARs have been doing this for years," says Jeffrey Geibel, a consultant at Geibel Marketing Consulting. Any opportunities remaining here will be in specialized, image-enabled vertical market applications.

MULTIMEDIA. "There's not much of a product for a VAR," Casal Group's Gene Bledsoe says. Geibel agrees that other than for training, multimedia doesn't offer much for VARs. Cuban dismisses it as a niche product with little widespread appeal.

ASYNCHRONOUS TRANSFER MODE. This high-speed wide-area network protocol won't be ready for prime time in 1995, "but it will be very important down the road. Now is the time for VARs to learn it before they need it," Cuban says.

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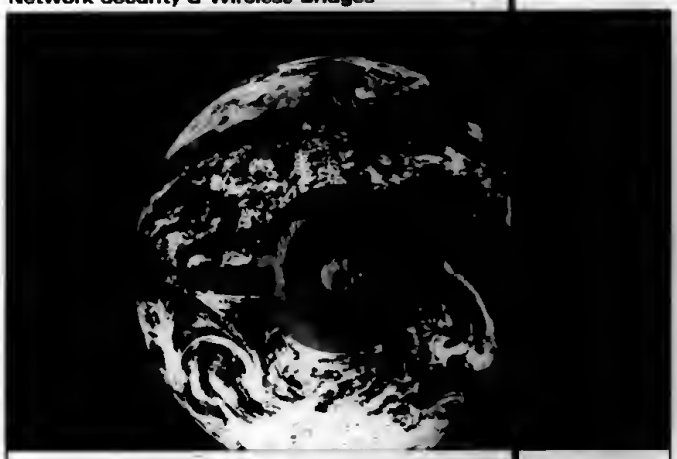

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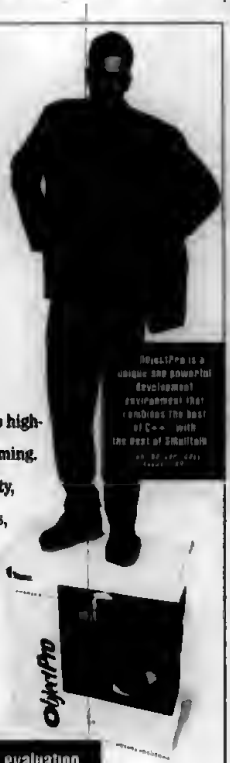

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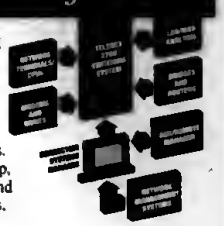

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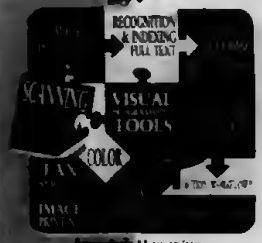

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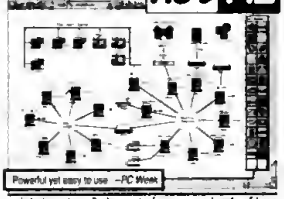

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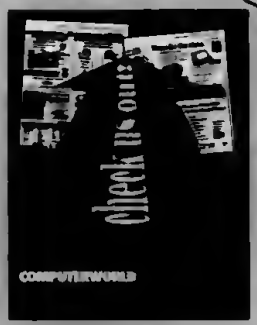

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Borland's Maib resigns

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erations. A Borland spokesman would not comment on that possibility.

Reaction to the executive shuffle was swift and negative.

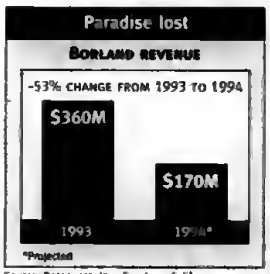
"I still don't understand how [Borland's board] would let Philippe run this company when he has already driven it straight into the ground," said Timothy McCollum, an analyst at Dean Witter Reynolds. "Their best chance was in letting Maib run the company."

Lost customers

Borland's inability to execute its operations has cost it some customers, said Bill Meeker, director of the dBase User Group in Kansas City, Mo. Borland was slated to make a presentation before the group earlier this year.

"They didn't show up, and they didn't even bother to call and tell us they wouldn't make it," Meeker said. "Borland doesn't act like a winning team. Microsoft does. They show up often at the Access User Group meetings. Their group is getting bigger while our group is getting smaller."

Borland's board of directors responded to Maib's departure by promoting Chief Financial Officer Gary Wetsel to executive vice president of operations. Wetsel, who started at Borland Nov. 1, will assume Maib's operations responsibilities until a replacement is named. Maib, meanwhile, will stay on indefinitely as a non-officer employee.



Source: Dataquest, Inc., San Jose, Calif.

Maib was not available for comment.

However, Maib told *Computerworld* one week prior to his announced departure that rumors of his resignation were "bad and dangerous." He insisted he had not resigned and was not considering it, citing his job as half-done.

Now, with Maib on his way out, Borland faces what it describes as a "substantial operating loss" for its quarter ended Dec. 31, 1994. Moreover, the company is expected to implement layoffs of up to 600 staffers and a restructuring while rolling out a major new product — Delphi 95 — in the first quarter of 1995. The beleaguered developer could also find itself selling off its database product lines as part of its restructuring efforts.

Slash in cash possible

Borland could also face a significant cash drain, resulting from a lawsuit in which it was found by a lower court to have violated the copyright of Lotus Development Corp.'s 1-2-3. An appeals court ruling is expected shortly; if it upholds the earlier verdict, damages would be assessed in March.

Estimates of Borland's damages range from a nominal charge to more than $200 million. While Borland has no contingency fund set aside for the charges, it will hold an estimated $50 million in cash at the close of its fiscal year ending in March.

Borland's woes are causing some discomfort for its business partners. For example, WordPerfect, the Novell, Inc. Applications Group has invested substantial sums and resources to enable Borland to develop Paradox for Windows for its PerfectOffice suite.

"It would set us back a lot to go back and rethink the database" for the suite, acknowledged Glen Mella, a product manager for PerfectOffice. He said negotiations with Borland ended after Borland sold its Quattro Pro spreadsheet. He would not comment on whether any further talks were proceeding with Borland over the fate of Paradox.

"There's all kinds of thinking and talking going on," Mella said.

Cyberspace

CONTINUED FROM PAGE 1

suggested that on-line communication accelerates the pace of dialogue among interested parties and the formation of public opinion. "On the 'net, information may not get out any faster, but the part that forms a conclusion happens faster," he said.

Look who's talking

For example, from a consumer standpoint, the Internet enables anyone with a gripe against a product or company to bypass the frustrating and seemingly isolated letter of complaint and immediately broadcast his outrage to an audience of thousands, if not millions. The result can be virtually instantaneous feedback about the extent of the problem or about whether other purchasers feel the same way — which has the potential to undercut any vendor attempt at spin control.

"Many times I've seen companies be vilified on the Internet, and I'm sure they don't know about it," said Clifford R. Kurtzman, president and chief executive officer at The Tenagra Corp., an Internet marketing company in Houston.

Kurtzman told the story of MCI Communications Corp., which started its Gramercy Press campaign by announcing the on-line service during the 1994 U.S. Open tennis tournament.

"People in the rec.sport.tennis newsgroup were saying how poor the ads were," said Kurtzman, adding that MCI obviously never checked the newsgroup to defend its ads and possibly drum up business for its on-line offerings.

Bradley Stillman, legislative counsel at the Consumer Federation of America in Washington, said the phenomenon of on-line consumer advocacy makes sense given that the demographic picture of the Internet includes a sizable number of "highly knowledgeable, grassroots advocates." He said these Internet communities are beginning to sound off on nontechnical matters such as public policy and legislation.

Things get out of hand quickly on the 'net. Just before Christmas, thousands of people mail-bombed three Santa addresses after hearing a rumor that a sponsor would send 10 cents to charity for each note received. The rumor stemmed from a real story: Sun Microsystems, Inc. built a World Wide Web site (north.pole.org) and said it would donate the 10 cents, up to $25,000, to charity for every visit.

One thing is certain: Millions of new users will join the Internet in the coming years, which means low-tech and no-tech businesses will increasingly be expected to answer consumer questions and complaints in this space.

In the Intel case, the public relations debacle may have been partly a matter of Intel's failure to accurately gauge the extremely high expectations of on-line users when it comes to responsiveness, according to John Barnhill, president of Silicon Reef, Inc., a San Francisco systems integrator that specializes in Internet and internetworking organizational issues.

"There's an expectation that within 24 hours or less there will be some sort of response" to a posting about a glitch or an E-mail requesting information, he said.

Perhaps in recognition of this, Intel President Andrew Grove posted a personal note in a key Internet forum. In it he apologized for the anxiety and offered his perspective on the situation.

An Intel spokeswoman said Intel observed two spikes in E-mail traffic related to the Pentium. The first followed Grove's newsgroup posting; the second came after IBM said it would stop shipping Pentium machines. Intel has full-time employees who check relevant Internet newsgroups, she said.

A difference in perception

Hahn said Grove's posting only "threw oil on the fire" because it came across as a media relations ploy rather than sincere participation in the discussion. Conversely, developers such as Microsoft Corp. and IBM have managed to avoid getting pummeled by the on-line community because they participate in on-line communities of interest, offering technical tips and software fixes, Hahn said.

Even so, this leaves excruciatingly little wiggle room for companies struggling with a crisis. Marketing experts said firms need plans analogous to disaster-recovery plans for these situations. For starters, they should participate in on-line forums and catch problems early, one analyst said.

New chips

CONTINUED FROM PAGE 1

sive replacement effort.

With an estimated 30% to 70% of all Pentium users likely to demand replacements for their flawed processor, "the bulk of the process should take about two quarters," estimated Dean McCarron, a chip analyst at Mercury Research, Inc. in Scottsdale, Ariz.

Under its new policy, Intel will send replacement processors to PC users who choose to replace the chip themselves and will offer them telephone technical assistance. Intel also said it planned to contract with service providers and OEM customers to replace the chip at no charge. Details will be provided in the next few weeks.

Despite the clarity of Intel's intentions, the devil will undoubtedly be lurking in the details, observers said. For instance, it could take several weeks for Intel just to identify third-party service locations and ship the necessary replacements to them. The company is still ramping up production of clean chips, and full volume is not expected until at least the end of January. Intel is quoting lead times of 30 to 45 days for replacement processors.

Who's calling whom?

There is also some uncertainty over who should handle customer calls and how. For instance, one Dell Computer Corp. customer who had a contract with Intel for a replacement was suddenly asked by Intel to renew his request all over again — with Dell instead.

The confusion apparently stems from the sudden desire by most major PC suppliers to handle the replacement process themselves — a precedent first set by the IBM PC Co. Dell, like all of the other major PC vendors, has asked Intel to refer Dell customers back to the company for all chip replacements. "Since the customers purchased the computers from us directly, we are asking that they come to us for replacement," a Dell spokeswoman said.

Other vendors agree. In many cases, this stance has led Intel to deflect customer calls back to companies that had originally asked the customers to contact Intel. At the same time, in all instances where customers demand a replacement from Intel, the company will comply, Intel said.

"I would rather go back to the system provider than to Intel. We are not dealing directly with Intel anyhow, so why should we go to them now?" asked Aijaz Nawdhia, a LAN administrator at Burger King Corp. in Miami.

There is also some uncertainty over whether self-replacement of processors would lead to a void in system guarantees in the future. Most vendors contacted said it would not. However, self-replacement or even third-party replacement could prove difficult. For instance, the heat sinks Intel is shipping with its replacement processors are not sufficient for the airflow characteristics of Dell's designs and could actually fry the processor down the road if not properly installed, Dell said.

INDUSTRY PULSE: High-performance computing

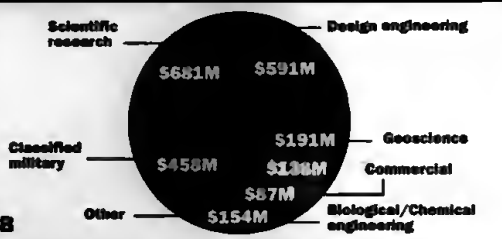
A diversity of new products will result in erratic behavior in the high-performance computing market over the next few years, with low-end and midrange systems becoming the driving force

Changes in platform popularity

Changes in defense and government spending and a focus on price/performance instead of absolute performance will alter market segments. High-performance mainframes will decline into a maintenance market, while RISC-based products will boost midrange popularity.

Uses of high-performance computers

Traditionally dominated by science and research, the high-performance market has begun to see a growing presence of financial and economic modeling and strategic business applications



1993 total: $2.3B

Market leaders

While IBM still leads a declining mainframe segment, it is developing a strong presence in the midrange arena

Supercomputers	1993 revenue	Share
Cray Research	$843M	70%
Fujitsu	$155M	14%

High-performance midrange	1993 revenue	Share
Convex	$145M	35%
Silicon Graphics	$122M	29%
IBM	$65M	16%

High-performance mainframes	1993 revenue	Share
IBM	$374M	81%
Amdahl	$47M	10%

Parallel processors	1993 revenue	Share
Intel SSD	$93M	30%
Thinking Machines	$90M	29%*

*Projected

Source: International Data Corp., Framingham, Mass.

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Inside Lines

Understatement of the year

After weeks of harsh criticism about his role in Intel's recent public relations debacle, CEO Andrew Grove may have been understating things a bit when he finally announced a no-questions-asked chip replacement policy. "The past few weeks have been deeply troubling," he said. "What we view as an extremely minor technical problem has taken on a life of its own."

New year, old org chart

Larry Ellison, Oracle's CEO, has decided to bring the firm's marketing department back under his own command and remove it from Ray Lane, an executive vice president. Some observers saw the move — which has so far cost Oracle at least three high-level executives — as just another internal line dance. But others wondered whether key new products due out in 1995, such as CDE2 or Project X development tools, could be delayed as a result.

The pope is not amused

Cable News Network broadcast a news report in late December — complete with Microsoft denials — about the possibility that Microsoft planned to acquire the Catholic Church. It seems CNN took a joke racing around the Internet a little too seriously. It all started with a clever 'net surfer who concocted a bogus press release that had Microsoft merging with the Vatican. In the tongue-in-cheek release, Bill Gates marveled at the Spanish Inquisition and other examples of Catholicism's history of "aggressive marketing."

Power to the people

Santa Cruz County in California is taking a proletarian approach to buying PCs as it puts in networks to run some of its applications. "We give them to the secretaries first because they actually use them," said Luther Ferry, information services director for the county. Ferry added that a lot of frustrated managers still have to make do with plain old mainframe terminals while their underlings get to create compound documents and play solitaire. Managerial types can get in line to join the PC fun "as soon as they figure out what they're going to use it for," he said.

A rift on the electronic frontier

Like a religious sect that splits up over subtle philosophical differences, the Electronic Frontier Foundation (EFF) in Washington has ousted policy chief Jerry Berman and replaced him with Washington cyberattorney David Johnson. Berman and two other EFF policy wonks are now starting an independent Center for Democracy and Technology. Meanwhile, the EFF plans a broader mission defending cyberspace on such topics such as liability, copyright, access, security, governance and globalization.

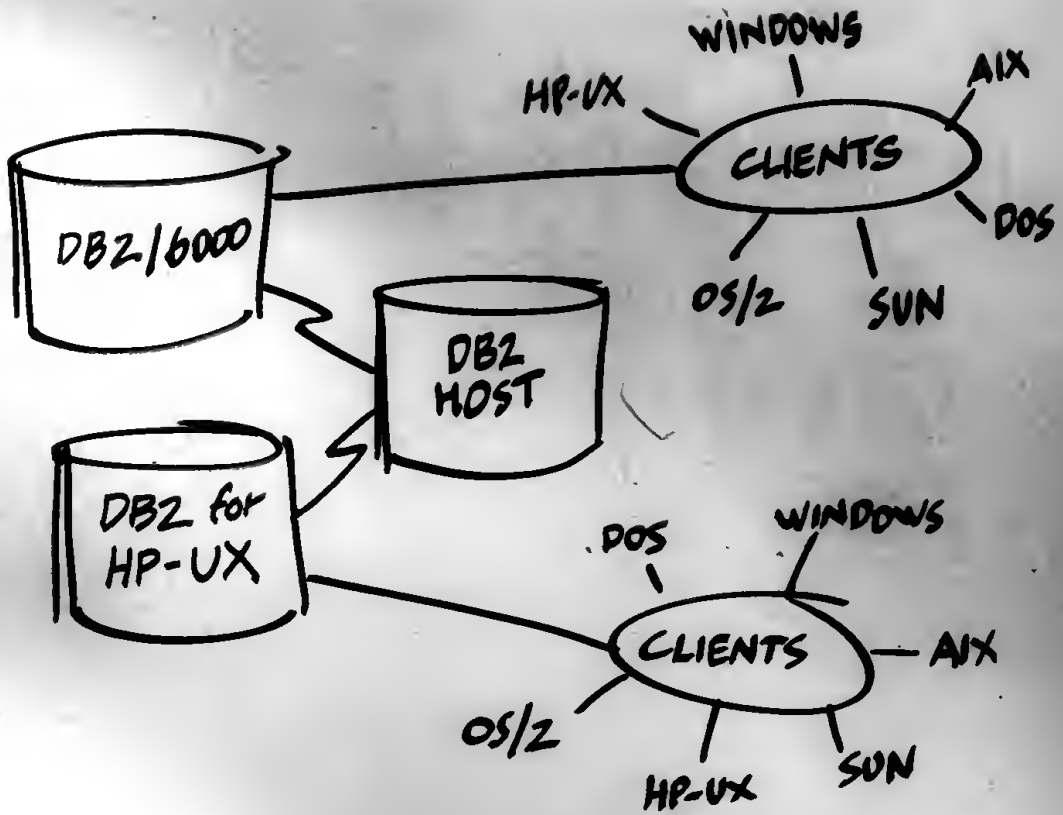
Paying for the privilege

Computer Associates didn't get to be the world's second-richest software company by spending money willy-nilly, even if it is Christmas. Indeed, a holiday greeting card arrived at *Computerworld*'s California bureau from CA with 80 cents postage due. And a very merry to you, too, Charlie Wang.

Diving for dollars

When informed that a Cabletron salesman had jumped out of an airplane to beat SynOptics out of a contract (see story page 80), a Bay Networks insider said, "Wow, that's creative." Upon reflection, he added, "I wish everyone in the company would jump out of an airplane. I'd even charter the flight." Reckon the two companies didn't exchange Christmas cards, eh?

The press materials we get can yield interesting bounty. One recent pearl: a fax from a mainframe customer heralding plans to implement "a mullet-faced computing environment." Now that smells like a multifaceted paradigm that won't attract many imitators. If you have a line on something fishy, hook* Computerworld *by calling our 24-hour voice-mail tip line at (508) 820-8555 or (800) 343-6474. News editor Maryfran Johnson can be reached by phone at (508) 820-8179, via the Internet at mjohnson@cw.com or through MCI Mail at 590-8017.



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